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TODAY, WE'D LIKE TO SHOW YOU HOW NICELY THEY'VE GROWN UP.



SCIENCE FICTION AGE

F I C T I O N

COVER: A starship under attack as it nears a hostile world. Art by Luis Royo. **ABOVE:** Gary Ruddell's classic cover for *Hyperion* is but one reason why you should turn to his *Gallery* on page 78.

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The coming of the aliens brought unparalleled changes to the Earth, and would cause Borgmann's name to be known forever ... though not in quite the way he'd expected.

Art on page 38, "Ghost Walk" © 1997 Rick Berry. <http://www.bred.com>

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FIVE YEARS AGO, THE FIRST ISSUE OF a revolutionary new science-fiction magazine invaded the planet's newsstands and mailboxes. The November 1992 issue of *Science Fiction Age* was a magazine with a message—that contrary to popular belief, it was possible to meld the best content SF's sense of wonder has to offer with a full-color state-of-the-art design package that speaks of tomorrow. The look and feel of the SF magazines published then seemed frozen in our pulp past, not by choice, but out of habit, and we at Sovereign Media decided to change all that.

Now, half a decade later, it's time to say thank you. Thanks not only to you, our readers, who have kept us alive as many other SF magazines have folded, but also thanks to our many contributors, whose ground-breaking work has made it all possible.

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Be sure to stay along for the ride for the rest of our first decade, which continues inside.

Scott Edelman

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LETTERS

Dear Mr. Edelman:

I very much enjoy reading your magazine. I have read many SF magazines and by far this one is the best organized with the best stories. The magazine has a nice balance of writers including the whole range of fame. This fortunately includes never before published writers — which includes me. I enjoyed your advice for A. Smith the last issue.

Aspiring writers must read and write voraciously, but most importantly, as if a commandment, thou shalt listen and learn what the editor wants, be it for the SF magazine or book publishing house. Many successful writers have had great problems with this in the past. Michael Crichton supposedly received many rejection letters before he got published, for example. And I'm sure I'll receive enough rejections to fuel an early-19th century steamship for over a year — I have a few already. The writer must find the right editor, like we all have to find the right spouse, in order to get published. However, the work must be well written and interesting if it has a prayer of publication. I have read many good SF stories and all too many poor ones — or was it that some of these stories were just too weird?

Just as beauty is in the eye of the beholder, the "fantastic" SF story is in the eye of the reader. We all have our special interests and prejudices. A personal example: the novel *Rama 2* was quite a disappointment, even though Arthur C. Clarke is my favorite author. Clarke is so famous that he could probably submit anything and get it published so he is not a good example. The aspiring and professional writer must find an editor whom he or she can form a good connection with because the editor is at the top of the pyramid of the readership.

Robert V. Elley

While it may seem that way to aspiring writers, to most editors, it is the writers who are at the top of the food chain. You are the ones who write the stories we need to publish, and therefore, the true possessors of all power. When I find a story that I want to purchase, I assure you that I am far luckier than the writer. But let's just keep that between the two of us; we wouldn't want all the other writers to find out ...

Dear Mr. Edelman:

I am writing in regards to your Editorial in the March '97 issue. I agree that it is awful that science fiction funding has been so split in recent years into media and print camps. Print SF fans don't seem to realize that *Star*

Wars, *Star Trek*, *Battlestar Galactica*, *Babylon 5*, *Back Rogers*, *Flash Gordon*, and *Superman* sprang from the works of Asimov, Heinlein, Clarke, and Bradbury, the same works that in turn inspired Bova, Benford, Zahn, Bear, Rasch, etc. Only in *Science Fiction Age* can one find a short story by Fredrik Pohl in a *Star Wars Special Issue*.

However, there is a light in the darkness. Ever since Timothy Zahn returned us to a galaxy far, far away, an increasing number of top-name science fiction writers have written media-based and comic-based novels. Among them are Kevin J. Anderson, Roger MacBride Allen, Kristine Kathryn Rusch, Dean Wesley Smith, Julia Ecklar (as half of L.A. Graf), Karen Haber, Jerry Olton, Charles Grant, David Bischoff, Pamela Sergeant, George Zebrowski, and even James Gunn. We can only hope that this trend will continue, and lead a way to a mending of the breach between print SF and media SF.

In the meantime, I plan on continuing to enjoy both halves of the field. In fact, I'll also continue to enjoy comics, video games, and anything else that has splintered off of SF fandom.

Sincerely,
Amy S. Farmer

My views are even more strongly held now than they were a few months ago, as I am now editing another media magazine for Sovereign Media — Sci-Fi Universe.

Dear Scott & Co.:

Will genetic engineering bring a larger cry for the rights of the unborn? Will nanotechnology truly end the problems of mere material need, and if so, what will be important after that? These questions and others are ones that SF can deal with (and to some degree it has). Other questions are possible. Will humanity unite against a hostile alien threat? Or would humanity be even more splintered by diverse alien cultures?

SF could have profound implications and influence on future politics depending on how authors deal with politics in their stories. Science fiction can provide the "social experiments" that our current society won't allow in real life, and influence the politics of the future. If the authors dare to.

Michael Clem

Readers — please let us know how we're doing at: Letters to the Editor, Science Fiction Age, 11305 Sunset Hills Road, Reston, VA 20190. For e-mail, use S.Edelman@Gente.Com. or our CompuServe address of 102746,2004

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Haldeman and Miller do sequels, while Swanwick makes a deal with the Devil.



Michael Swanwick's Jack Faust puts a science-fictional slant on a mythic story. Art by Greg Spalenka.

OUT OF ALL THE THINGS HUMANS DO, WAR AND religion seem to get the lion's share of justifications. The arguments in support of both run the spectrum from legitimate moral activism to pathetic excuse-making. Regardless of what position one might take, though, it seems remote that humankind will ever reach a point where we will leave either behind. They are inextricably a part of that nebulous collection of conditions we call Human Nature.

Of the two, war seems to get the most attention when it comes to finding excuses. Unlike religion, it is difficult if not impossible to imagine or define a benign state of war. There are popular causes, like wars on disease or wars on civil inequities, but we all know the difference.

Actual war — armed conflict — is different from those other endeavors, different in kind as well as cost. And unlike popular movements that are called wars, war is the only activity we wish we could be rid of completely. As a tool, war is one we would like to never have to take out of the tool crib again.

Or so we say. Somehow, we always find a reason to do so and we always regret it and we always declare that this one should be the last one ...

Joe Haldeman has written eloquently over the years of the various conditions under which human beings go out to wage war on each other. He has shown us most of the arguments for and against. In an impressive body of work, he has dealt with the subject both passionately and evenhandedly, with the aim to make us think about this thing as clearly as possible. He has shown us the pitfalls, the moral traps, the slippery slopes, the true dilemmas, the false pretenses, and the frustrating inevitabilities of war and our willingness to use it, indulge it, to preserve it and keep it ready, to reach for it even when another way will work. He has shown us that it is a human condition. In all that work, he has brought us to the point of recognizing that to do away with war will require that humans be changed fundamentally.

In his first novel, *The Forever War*, that change came about as a result of evolutionary process — social evolution, certainly, as well as a nudge from nature — over the course of a war protracted by relativistic time dilation that made relics of the warriors even while the changes necessary to be rid of war itself proceeded behind the front lines. Humanity altered and war became ... vestigial, an oddity. We grew out of it. Now he returns to those questions in *Forever Peace* (AvoNova, hardcover, 368 pages, \$21.95).

Julian Glass is a physics teacher. He is also a mechanic, a draftee specially equipped with a jack that allows him mind-to-machine interface with a soldierboy, a robotic warrior he controls from a safely protected cage tens or hundreds of miles from the actual war zone. He is the platoon leader of a "harassment and interdiction" unit, intended for use as an intimidating presence in enemy territory, reconnaissance, and other more political missions than the "hunter/killer" units that do exactly that. Julian was drafted. He inhabits his soldierboy 10 days on and then takes 20 days off to return to his life as a teacher. He is ambivalent about the war, dislikes the hunters/killers intensely, and is suspicious of the political situation that has prompted the conflict, which, Haldeman makes clear, probably will never end.

The enemy is the Ngundi, a loose coalition of Third World peoples — few actual states, but a lot of legitimate governments sympathize — who are in open rebellion against the Alliance, which seems to comprise North America, Europe, Japan the other developed nations. They are in rebellion because now — in 2043 — the economic situation that has always been blamed for the class disaffection in the world is abundantly and manifestly unfair.



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N O V E M B E R



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"Wittenberg at the birth of the century was a microcosm of the human world... as ripe with life as an old pear that sashes when shaken."
from Jack Faust

The Alliance owns proprietary control of the nanoforge, the magic box. Feed it raw material, ask it for something, and it makes it. Material want could be effectively over, globally. The nature of work, the value of money, the long-held arguments in support of the inevitability of poverty—the nanoforge renders all of it academic.

Or could. The Alliance rations the nanoforges and their products, a careful balancing act to maintain global superiority and a semblance of the old economic verities that have informed human relations for thousands of years. The Alliance will sell the produce of the nanoforge, but will not give a nanoforge to a poor country. The status must remain quo.

Under these conditions the Ngumi War will go on and on and on. The "enemy" will never accept that Aladdin's lamp will be kept locked in a vault in North America or Europe. It is immoral. It is not fair. It is very much Us against Them.

Julian's lover is a colleague at his university, a cosmologist named Amelia Harding. She is one of a vast team of scientists at work on the largest particle accelerator ever built, the Jupiter Project. Aside from their work, Julian and Amelia struggle with a couple of distinctions that make it difficult to be open about their affair and awkward for them personally. For, Julian is black and Amelia white. Old race hatreds have resurfaced with the Ngumi War because so many of the "enemy" have black skin. The second problem is related to Julian's work. Not the soldiering, but the jack.

When jacked into his soldierboy with his platoon, Julian not only operates the machine, he shares minds with his cadre. They live inside each other, know each other's thoughts and feelings. This gets particularly unsettling when one dies while jacked—which happens at an alarming rate due to stroke or heart failure. Amelia is deeply envious of his ability to jack and share. It is not academically politic for her to have a jack installed—it could hurt her career—and she is too old

to join the army.

Amelia goes to a Mexican clinic and has the jack installed anyway. The trouble is, she is also one of a minority of people for whom it simply doesn't work.

On top of this complication, Julian experiences a profound depression when he kills a child during a riot. He attempts suicide. He finds himself relieved of duty. To distract him, Amelia invites him to help her with a line of research concerning the Jupiter Project which has some very disturbing implications. Julian agrees and joins her and her colleague. Their conclusions make it imperative that the Jupiter Project never go on-line.

When the research paper is submitted for peer review, they find themselves suddenly the targets of an extremist religion whose stated purpose is to bring about the end of the world, and whose membership includes many of those responsible for the war itself.

At this point, Haldeman asks the question: What if you had a magic pill you could give to people that would make it impossible for them to kill other humans? What if you could actually change the nature of people so that they could no longer actively do harm to each other? After them from homo sapiens sapiens to homo sapiens pacificans?

Would you? Would the ability automatically mitigate the moral questions of choice and identity that would inevitably be raised? And what would the cost be?

Haldeman doesn't tell us what to think. For now there is no such pill or device; the question is purely philosophical. Until such time as the question may be more than academic, the best we can do is to work it out for ourselves where we stand on the question of war and its acceptability, to do the hard work at learning empathy without benefit of being able to literally touch another mind. Haldeman neatly and with great skill engages us in the debate, plants the questions, and invites us to once more think this thing through, in all its ramifications, while telling us a very good story.



Saint Lebowitz and the Wild Horse Woman by Walter M. Miller, Jr. Bantam, hardcover, \$23.95, 432 pages.

Can you project yourself mentally back to the America of 1950? The Cold War is as sharp and inescapable as a cactus thorn in a desert monk's bedroll, offering every citizen the prospect of unannounced atomic incineration. And as if in warn-

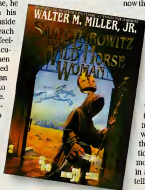
ing, radiation levels on the East Coast have increased 300% following open-air nuclear testing in the USSR. On the SF front, *The Magazine of Fantasy and Science Fiction*, a healthy ten-year-old, is thriving. And this distant year will see the appearance of a "fix-up" volume assembled and expanded from three novellas previously published in their pages between 1955-57. The overarching title of the new book is *A Canticle for Lebowitz*, its author Walter M. Miller, Jr. Without much fanfare, a classic is unveiled—perfectly of its time, yet eternal. Over the next four decades, *Canticle* will sell millions of copies and become one of the few SF books that even "outsiders" recognize. The skill and talent, the sensitivity and wit that Miller exhibits in this book portend a bright future for the 37-year-old writer.

From today's vantage, however, we know Miller's story to be a sad one of brilliance partially unfulfilled. After the publication of *Canticle*, a long Salingeresque silence ensued. Then, in January of 1996, Miller, suffering from ill health and mourning his recently deceased wife, died by his own hand.

From the ashes of Miller's obstinately self-fashioned life, however, something new has emerged phoenix-like: *Saint Lebowitz and the Wild Horse Woman*. Nearly complete at Miller's death, this book—neither prequel nor sequel, but rather an insertion at the midpoint of *Canticle*—has been carried to the finish by Terry Bisson, well-respected author of *Talking Man* (1986), among others.

Any discussion of the new Miller must invariably spring from an appreciation of the first book. I won't go into an elaborate synopsis of *Canticle*. Rather, I'll mention some of what made Miller's early work so attractive and original.

Miller's tripartite novel—where a sense of time accelerating out of control was subtly conveyed by the first section spanning years, the second months, and the third only days—is a post-apocalypse in line with other examples so abundant after Hiroshima. Leigh Brackett's *The Long Tomorrow* and John





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Wyndham's *Re-Birth* (both 1955) immediately come to mind. Yet Miller's book was unique in the quiet majesty of its finely wrought prose; in its evocation of a life of religious commitment; in its humorous exposure of that same religious impulse as susceptible to major misapprehensions (interpreting the grocery list of an engineer named Leibowitz as sacred); and in its depiction of Time as healer and destroyer in a paradoxical manner reminiscent of Hindu theology. Miller also had no pulp companions against killing off major characters in quick and shocking ways if his themes demanded. And although non-SF readers could enjoy the book without recognizing its allusions, members of the SF community could detect and enjoy its extra layers. *Canticle* reworked Wells' *Things to Come* (1935), with its imperial Boss figure confronting keepers of science. The book also offered a counterpoint to Asimov's *Foundation* series, insofar as both depicted attempts to preserve knowledge during an interregnum.

In short, *Canticle* offered both surface pleasures and symbolic depths. Could any new work do the same? In revisiting the Leibowitz saga, the shock of the new is gone. We are returning to familiarity, and our surrounding culture no longer exhibits quite the same mix of fears and dreams that gave birth to the original. Miller's future might appear retrograde, and the known ending of *Canticle*, during which a second apocalypse arrives, might tend to overshadow the new action. Moreover, Miller's prose might not be up to snuff.

I'm happy to report that these qualms obtain, if at all, only to a minor degree. *Saint Leibowitz* is on its own terms an utterly involving book. A full-fledged novel rather than a fix-up, it surveys one human life in particular with Miller's trademark tough love and affectionate tolerance for moral lapses, and illuminates the culture and world of the original with intriguing new details.

Our viewpoint character is Brother Black-

BOOKS TO WATCH FOR

Starship Troopers, by Robert Heinlein (Ace). Before you go see Hollywood's big budget interpretation of Heinlein's masterpiece (for more news of which see this issue's Movie column), read this re-issue to remember how the greatest of the Grandmasters did it right.

Bringing the Jubilee, by Ward Moore (Ballantine del Rey). As part of del Rey's Alternate History month, Moore's most famous tale returns. The first and still the best novel positing an alternate time-line spun off the Civil War, setting the standard for all SF writers.

The Rise of Endymion, by Dan Simmons (Bantam Spectra). The multi-volume *Hypervelocity* saga began with a Hugo Award, and it might just end with one as well. Simmons re-explores the universe that made him one of the defining SF writers of the last decade.

Star Trek: Heart of the Sun, by Pamela Sargent and George Zebrowski (Pocket). The husband and wife writing team, long known for their intellectually rigorous literary SFnal outlook, turn their attention to lives of Gene Roddenberry's spacefaring offspring.

American Goliath, by Harvey Jacobs (St. Martin's). A welcome new novel from the famed author of "The Egg of the Clock." Jacobs brings his considerable talents to bear towards bringing to life the bizarre events surrounding the Cardiff Giant hoax.

A Geography of Unknown Lands, by Michael Swanwick (Digere Press). A long-awaited collection of dazzling short stories from the Nebula-Award-winning author of *Stories of the Tide*. If you liked *Jack Faust* (see lead review), you love this.

Beneath the Gated Sky, by Robert Reed (Tor). Reed returns to the world of *Beyond the Veil of Stars*, which met with success both within the field and without — it was selected as a *New York Times* notable book. The love story of Porche and Cornell continues.

Back in the U.S.S.A., by Kim Newman and Eugene Byrne (Mark V. Ziesing). The war between communism and capitalism wasn't guaranteed to turn out the way it did. Newman and Byrne lead us on a warty romp through an almost familiar history.

Troika, by Stepan Chapman (Ministry of Whimsy Press). Here's further proof that the small presses can compete with the big dogs at their own game. This tale of a bizarre trio's journey across a desert planet delivers the goods.

Babylon 5: To Dream in the City of Sorrows, by Kathryn M. Drennan (Dell). The definitive *Babylon 5* novel, blessed by J. Michael Straczynski himself as canon. This is the first original *B5* novel written by someone who has actually written for the show itself.



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"We're especially looking for poems from new or unpublished poets," indicated Howard Ely, spokesperson for The National Library of Poetry. "We have a ten year history of awarding large prizes to talented poets who have never before won any type of writing competition."

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1 Poetry Plaza

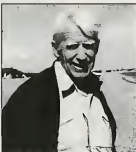
Owings Mills, MD 21117-6282

Or enter online at www.poetry.com

The poem should be no more than 20 lines, and the poet's name and address must appear on the top of the page. "All poets who enter will receive a response concerning their artistry, usually within seven weeks," indicated Mr. Ely.

Possible Publication

Many submitted poems will also be considered for inclusion in one of The National Library of Poetry's forthcoming hardbound



Gordon Steele of Virginia, pictured above, is the latest Grand Prize Winner in The National Library of Poetry's North American Open Amateur Poetry Contest. As the big winner, he was awarded \$1,000.00 in cash.

anthologies. Previous anthologies published by the organization have included *On the Threshold of a Dream*, *Days of Future's Past*, *Of Diamonds and Rust*, and *Moments More to Go*, among others.

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tooth St. George, young monk in perilous standing in the Lebowitzian Order, living a century or so after the action of the "Fin Lux" section of *Canticle*. Born a Nomad — the term used for the resurgent Amerindians of the barbaric West — Blacktooth is torn between his adopted Christianity and his native beliefs, embodied most concretely in the beneficent/savage deity known as Wild Horse Woman.

Expelled from his abbey (more a peripheral institution than a central one in this book) for insubordination, Blacktooth becomes formally attached to Elia Cardinal Brownpony, another church-adopted Nomad. Brownpony is the altering Machiavelli of this novel, a man torn between temporal and spiritual concerns. His ambitions will lead to his eventual election as Pope, and to war with the ruling Caesar, Filipo Haro, Caught up in the turmoil, Blacktooth undergoes numerous adventures, falling in and out of picturesque situations suited to a Fielding novel. He experiences sex, treachery, and mystical teachings, among many other marvels, leaving him by book's end a transcended figure, wiser perhaps, but definitely sadder. (Remember that Miller's definition of God from *Canticle* is "Immeasurable Loneliness".)

Miller's prose is fully as rich as in the first volume, and a loosening of cultural restrictions also allows him a wider exploration of sex and scatology. (Surely you always wondered about homosexuality among the Lebowitzians monks.) Chapters 10 and 11 alone are confirmation of Miller's undiminished powers: as the rogue hermit Amen Specklebird — source of much accurate Buddhist theology — addresses the stunned conclaves of Cardinals for a record seventeen hours, Miller simultaneously confounds and amuses.

Terry Bisson's serviceable prose, which I would guess begins roughly around Chapter 25, has the unenviable task of tying up all the plot threads strung by Miller, and does it well. Missing is a certain tone of hard-won Milleresque wisdom in all the obligatory battle scenes, although Brownpony's death and Blacktooth's own long quietus afterwards do attain a kind of deep grace. Allusions to the original book are numerous, including the figure of the Wandering Jew and in Chapter 30 a replay of *Canticle*'s closing scene.

While it seems unlikely that *Saint Lebowitz* will ever achieve the high literary status of *Canticle*, the new book remains a vital addition to one of SF's most enduring allegories.

Jack Faust, by Michael Swanwick. *Avon Books*, 352 pages, hardcover, \$23.00

Here is Faust preaching a sermon on Easter morning: "Faust climbed the stairs to the pulpit. Dark brown and deeply carved with a hundred suffering martyrs, it leaned over the congregation like the prow of an oncoming ship. The radio-men huddled in the front pew over their acid batteries and boxes of electrical equipment."



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Some SF images are so deeply burned into our shared consciousness that they cannot be forgotten. The monolith at the beginning of 2007, the huge and gleaming robot Klaatu walking with Michael Rennie down a spaceship gangplank in *The Day the Earth Stood Still* — and *God of the Robots*, the Frank Kelly Freas painting of a mechanical man cradling a

SCULPTURE

human that served as the cover for the Queen album

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It's starting to look a lot like Christmas, and all of Santa's reindeer are getting in shape for the season. On Dasher, on Prancer, on Vixen, on Yoda! Yoda? Yes, Yoda. Twenty years after *Star Wars* changed the face of filmed science fiction, the 1997

Hallmark Keepsake Ornament Collection celebrates this historic event by producing five Special Issue *Star Wars* ornaments. Luke Skywalker will be the first in the series to appear at the 15,000 stores nationwide that carry the Hallmark brand, to be followed by Darth Vader, Yoda, C-3PO and R2-D2. The Darth Vader ornament even speaks, warning, "The Force is with you, young Skywalker."

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Actor John de Lancie, who has made miracles come true in his role as Q on *Star Trek: The Next Generation*, is busy making miracles come true in reality, by bringing some SF classics to life as radio plays. H. G. Wells' *The Time Machine* and Jules Verne's *Journey to the Center of the Earth* are the first in the Alien Voices series to be published by Simon and Schuster Audio, which has brought de Lancie together with fellow Trek icon Leonard Nimoy. "I was raised on the classics — Jules Verne, H.G. Wells, and others," said de Lancie. "Now we can bring these to even wider audiences by means of new technologies and old friends...."

We are presenting Verne, Wells and other giants of the science fiction genre as they themselves might have wished to be heard." Said Nimoy: "After years of being associated with other people's projects, we wanted to enter the next century at the helm of our own." Arthur Conan Doyle's *The Lost World* is to follow shortly as the third entry in this well-produced series of SF's earliest future visions.



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ANACONDA: Gene Siskel and Roger Ebert gave two thumbs up to this thriller of an obsessed hunter who hijacks a young film crew while chasing after a mythic, man-eating snake. This #1 box office hit stars Jennifer Lopez, Ice Cube, Eric Stoltz and John Voight, and features state-of-the-art special effects.



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AUSTIN POWERS: *International Man of Mystery:* Mike Myers proved that there was life beyond *Saturday Night Live* with the success of this good natured spoof of '60s spy flicks. Myers played dual roles, starring as both the hero and the villain of this piece, and was joined by co-stars Elizabeth Hurley and Michael York. Groovy, baby!



ASTEROID: An asteroid headed on a collision course for Earth is destroyed by laser beams before it hits our atmosphere — and our true troubles begin. Folks who've seen this before on television might be pleased to discover what Richard Simmons has known all along — that there are benefits to slimming down. This disaster flick has been cut to 120 minutes from its original two night, four hour format, and proves that bigger is not always better.

STAR TREK: Deep Space Nine: Four new 46 minute installments are being beamed down from the third of the *Star Trek* series — "The Siege," "Invasive Procedures," "Cardassians" and "Meera." As an extra-added value, each of the boxes of

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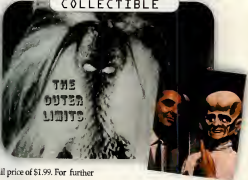
UNIVERSAL WIDESCREEN COLLECTION: Universal Home Video is unleashing many SF features as part of its Widescreen Collection. *Dragonheart*, *Apollo 13*, *Waterworld*, *Jurassic Park* and others have been digitally mastered in THX for enhanced sound and picture quality, while *Psycho* and others are available in a widescreen format for the first time. You'll recognize these titles by their new distinctive foil packaging.



no LIMITS

There is nothing wrong with this magazine. Do not attempt to adjust the pages. We are now controlling the transmission of the eerie visages at right. They are but two examples of the television magic on evidence in *DuoCards'* 81 card collectors series *The Complete Guide to the Outer Limits*, which will showcase both the classic and current versions of one of science fiction's most creative anthology shows. The series will be an encyclopedia in card form, featuring unpublished photos, episode synopses, cast credits and more — for example, nine of the cards will be reprints from the rare, classic 1964 Topps *Monster* card series. The cards will be retailed at seven cards to the pack for a suggested retail price of \$1.99. For further information, check out their website at www.comicimages.com.

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Robert A. Heinlein's *Starship Troopers* finally makes it to the Big Screen.



ABOVE: The future war that SF fans have been looking forward to for years is at last here — be glad you're just watching it, instead of living it.

IN 1959, WHAT WAS SUPPOSED TO BE ROBERT A. HEINLEIN'S 13th juvenile novel was scheduled to debut. However, the publisher thought the manuscript for *Starship Troopers* too militaristic for younger readers and the novel was released as an adult title. It went on to win a Hugo Award and become one of Heinlein's best-loved books. It went for 38 years without being adapted for the movies (although it did become a game from Avalon Hill and served as an influence for James Cameron's *Aliens*). But now Johnny Rico, Dizzy Flores and the rest of the Mobile Infantry will be fighting bugs on the big screen, in a big budget movie from director Paul Verhoeven (*Robocop*, *Tufel Recall*) and Heinlein's fans are concerned.

"The difficulty with this book, says screenwriter Ed Neumeier, "is that it's not only liked, but loved by its fan base and they are a group of people who are used to seeing their favorite things destroyed by Hollywood. And I always thought, gee, if Robert Heinlein, who I always loved as a boy — I hoped he would not be too upset by what I did, so I tried to write it as close to the book as I could. I read the book a couple of times, and then I made some notes about what I thought I could use from it. You

know, I wanted to keep as much intact from the novel as possible, so I referred back to it a number of times.

"Books are different from movies. The book is told as a first person remembrance, essentially, of a number of classroom situations. What surprised me when I went back to the book — you know, as a boy I read it and felt like, oh, this is like a movie about being a starship trooper jumping out of spaceships and fighting giant bugs. There's a little of that in the book, but it's really a political treatise. That's what Heinlein wanted to write, and it's almost thinly disguised as a juvenile adventure novel. I didn't think that Paul Verhoeven or TriStar would make a movie about sitting in classrooms, so I think you had to open it out or open it up as indicated in the book. I followed the events that Heinlein laid down, whereas he said, '...and then I remembered that terrible battle we had on whatever planet.' As a screenwriter I would try to invent a battle you actually saw them going through."

"I think it will be exceptionally well received," notes co-producer Alan Marshall. "I also think that Ed Neumeier and Paul kept very much the spirit of the Heinlein novel, so hopefully it's not going to disappoint Heinlein's fans. I think a movie's a movie, and you have to devi-

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ABOVE: As opposed to last summer's blockbuster *Independence Day*, which had Earth invaded by aliens, *Starship Troopers* sends out Earth soldiers to bring the battle onto alien territory. **BELOW:** Earth's army preparing for battle while orbiting a distant world.

ate from the written line to actually encompass what we encompass within the two hours that we have on the screen, but I think they should be very well satisfied with the form that we've produced."

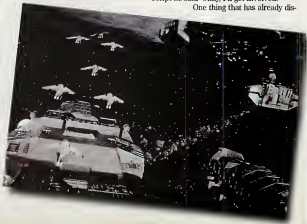
Neumeier came to be the screenwriter of *Starship Troopers* thanks to his involvement with *Robocop*. "I became associated with it," he says, "because one day, about five or six years ago, [co-producer] Jon Davison, with whom I'd made *Robocop*, said to me, 'We should do that again.' I think a couple of days later I said, 'let's do a giant war movie. We'll set it in the future, and let's make it against giant insects since we can't fight anybody any more here.' And I said I think it's a little like *Starship Troopers*, really, you know, because that's a book that everyone loves.' I said, 'I know we'll never get *Starship Troopers* because somebody probably owns it, so we should probably do something that's like that but try not to rip that off — that sort of thing. Everybody rips it off.'

"So we started talking about it, you know, working on some stuff, and then John Davison did the smart thing: he actually checked into the availability of the book and found that it had never been optioned before, and that it was available. We were just astounded

and he got Tristar to option it and ultimately buy it for us. And it was like whenever you're a kid and you say, 'well, if I ever get to make a movie, this is the book I'd like to make a movie of.' And then I found myself in the daunting process of trying to do that. We always had in mind that it

would be a project we would undertake with Phil Tippett, who is the great creature designer for all those movies, and also with Paul Verhoeven at the helm. I think that we told him that we were going to do it, and showed him a script one day, and he was aware of it and when we did show him a script he said 'Okay, I'll get involved.'"

One thing that has already dis-





mayed fans of the book is the decision to scrap the powered armor suits utilized by the mobile infantry. "The powered armor debacle!" says Neumeier. "Yes, that's a tough one, and it's something that as a writer I really kept in the script as long as I possibly could. We really got to the point where it was truly an expensive item. We developed it up through I guess about the third draft, and right as we were in actual preproduction—ready to go—we sort of had to make a decision about where we wanted to spend some money. This is a movie that, although it has a high budget, it's kind of like doing a Roger Corman movie on a big budget, because everywhere you turned around, you couldn't have something. In this case, it was a kind of decision of where we wanted to allocate our CG budget, because the power suits would have been a big CG item. It just was: do we want to do the bugs well, or do we want to compromise and try to do a couple of things maybe not so well. And I think that the closer we got to it, the more we felt like: gee, we don't want to compromise the bugs, because if they don't work we're completely screwed. And the power suits looked like they could be just as expensive as the bugs were going to be.

"I know that Paul Verhoeven was really intrigued by the power suits at the beginning, but as he saw more and more of the logistical

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LEFT: In the army of the future, the concept of women in the military will no longer be an issue, for in Starship Troopers, the militia is fully integrated.

problems mounting — I remember one budget that literally had something like three or four weeks of just shooting people on wires, which we did just a tiny bit of, and it's such a painstaking process that we simply could not have done it in the time we had. We shot 122 days, which was exhausting enough. I think my first draft, which was very close to the book, if we had actually tried to go out and shoot it, would have

cost \$250 million. Just enormous. And there wasn't a page that went by that didn't have what amounted to millions of dollars of effects on it. I think when we got into this at the beginning, before we actually started putting numbers down there was actually this period where we thought, 'oh, all things were now possible with the advent of CGI'. And indeed, almost everything is, if you have just a lot of money."

Location shooting took place in Wyoming and South Dakota. "The logistics of the film were fairly large," says Marshall, "and then the visual effects in themselves was a very large undertaking. We shot a great deal of the alien planets on location in Wyoming and South Dakota. The plan there was shooting the plates that were going to be used as the either the backgrounds or foregrounds for our bugs, and that was very meticulous, very demanding, obviously not much on me, but on the crew and the director in terms of getting the action exactly correct for Phil Tippett to be able to paint in on his computer the 3D bugs.

So that was very difficult to plan, because it meant so many facets that had to come together and be working, against an enemy that wasn't really there. It was a little Harryhausen in that respect: the people were shooting at something that wasn't there until much later."

There were some difficulties on location in Wyoming, according to Marshall. "A, it's very high. It's one of the highest states in the Union: there's nowhere in Wyoming much below 4,000 feet and we were shooting at about 5,000. We were in a place called Hell's

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Half Acre, which was this very special-looking mountainous valley that was really almost below the road level. There was a road going past it, but you'd hardly know that Hell's Half Acre existed until you pulled over into the carpark and looked down and this rock formation sat in its own valley. And that was very hard because of A, the terrain, and B, we did reach fairly high temperatures, but not excessively high."

Still, there were reports from the set of many extras passing out in the heat. But the filmmakers did what they could to minimize this problem. "We had a great deal of pre-training," Marshall notes. "We pre-trained the major actors and we pre-trained a lot of the extras. We had pre-training sessions with the extras from running around in shorts and T-shirts and slowly getting acclimatized to the boots and the suits that they were going to be wearing, until they were doing their training for the last few days prior to shooting in full battle dress."

By now most people have seen at least one version of the trailers in circulation featuring Phil Tippett's computer graphic imaging of the "bugs," arachnid-like aliens bent on destroying Earth. "I was never worried about the bugs," says Neumeier, "because Phil Tippett is a genius. I can't say enough good things about him. He's the Ray Harryhausen of our time. He's not only technically gifted, which I think there's a good handful of people you can say that about, but he's truly got an artist's eye, and he makes beautiful images, and no one works harder than Phil on these things. I used to hang out up at his shop and watch his day — he works twelve, fifteen hours a day, it seems like."

Beyond his own stuff, he's an extremely good teacher. He put this shop together and hired a lot of people who were just out of art school and didn't even know what an SGI workstation was, and now you go up there and there's 200 people just buzzing along: a bunch of talented people who now have real careers to look forward to, and they've done some amazing stuff. [Phil] was the only guy on this movie who said, 'I'm gonna do this, I'm gonna stick to this schedule,' and he did. There was never a problem. I knew that if Phil was cut loose and did what he was able, [the bugs] would be fine."

"With the bugs it went fantastically smoothly," Marshall adds. "In fact they're all finished now: all the shots of the bugs were delivered within two or three weeks of the original schedule. It was amazing, magnificent actually, in terms of over 200 shots. That's only half of our movie. We have another 300 visual effects shots on top of that. The over 200 Tippett shots are without any of the starships, so we have another 170 or 180 of those shots, on top of the normal, small nuances that you do in terms of repositioning shots, etc. Adding shake onto shots and stuff like that for explosions. And so it all amounts up to about 500 visual effects shots." □

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Once so far away, Mars now seems just around the corner.



The surface of Mars has not delivered the same vistas as those promised by Roy Bradbury in *The Martian Chronicles* (above, art by Michael Whelan), but there is a beauty to be found there nonetheless.

THE RED PLANET MARS HAS MOVED CLOSER THAN ever before. Recent events that have focussed attention on our planetary neighbor include the discovery of evidence pointing towards possible life on Mars (which we covered at length in an earlier issue), as well as the recent *Pathfinder* mission, which just gave us spectacular panoramic views of the Martian surface. To discuss the implications of this latter event, we spoke to two SF writers whose work on the space program has helped cause many of these advances.

Geoffrey A. Landis works for the Ohio Aerospace Institute at the NASA Lewis Research Center. He is a participating scientist on the Mars *Pathfinder* mission; among his other contributions, he gave the rock which was the target for the *Sojourner* rover's first traverse the name "Yogi." Information on his science experiments on *Pathfinder* can be found at <http://powerlab.lerc.nasa.gov/go/SolarMars.html>. His fiction credits include the Hugo Award winner "A Walk in the Sun" and the Nebula Award winner "Ripples in the Dirac Sea." Wil McCarthy, an engineer for the Lockheed Martin corporation in Denver, has published four novels, including *Aggressor Six* and *Murder in the Solid State*. A fifth, *Bloom*, is on the way in 1998.

LANDIS: It seems to me that Mars exploration, or maybe just the public perception of Mars exploration, has really changed. Wil, you were on the team that launched the Mars Observer. What was it like to work on the MO?

McCARTHY: It was exciting, obviously. The fact that it went missing shortly before Mars Orbit Insertion definitely

colored my feelings about it, though. Historically speaking, Mars has not really been a very easy planet to reach.

LANDIS: That's for sure.

McCARTHY: I'm sure *Pathfinder* has been a lot more fun!

LANDIS: We were all chewing our nails when *Pathfinder* bounced in, I can assure you.

LANDIS: Oh, I'll bet. I don't think that anybody really, truly, absolutely believed it would work.

McCARTHY: Well I, for one, would like to commend the *Pathfinder* team on not only making it down to the planet, not only getting some fantastic science done, but also pulling off a mission with such a high "wow" factor. That little rover has captured the public's attention like nothing we've seen since Apollo.

LANDIS: The odd thing is that the rover was almost an afterthought to the mission.

McCARTHY: Not any more!

LANDIS: The "original" goal of the mission was just to test out the airbag landing system, and when they announced it, the robotics group said, "Hey, we've got a tiny little rover, can we

hitch a ride with you?"

McCARTHY: Smaller/faster/cheaper is definitely the new wave, and *Pathfinder* shows it can work.

LANDIS: It can indeed — as long as you're willing to accept the risk that sometimes it won't work. I think that's a good trade, but it's really true — the minute anything goes wrong, the press is all over you. (Fortunately my experiment has been working great!)

McCARTHY: Hey, the more spacecraft we send up there, the more things that can hitchhike along! I'm working on the Cassini mission to Saturn right now, and the press has *already* been all over us because the spacecraft is nuclear-powered. There is no plausible way anyone could ever be hurt by this thing — the radioisotope thermoelectric generator, the nuclear power source — but the idea of it seems to horrify a lot of people. I worry at the public reaction if anything goes wrong, even though radioactive material wouldn't be released.

LANDIS: That's going to be a great mission.

McCARTHY: Don't jinx it!

LANDIS: Saturn is a fascinating target.

McCARTHY: I don't know about you, but Mars is my favorite planet.

LANDIS: Well, mine too, of course. It's the most accessible of the planets, the one most likely that we might actually be able to go to ourselves.

McCARTHY: And live on, yes.

LANDIS: Although the virtual reality that *Pathfinder* is doing is quite astonishing, and gives you an odd feeling of



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The Sojourner rover pictured above proved to be a boon not just for scientists, but for toy manufacturers as well.

really being there, it's still not quite the same!

LANDIS: Nope. You know, one really surprising result from Pathfinder was the estimates of soil temperature during the daytime. You've got daily high temperatures around 10 degrees F, but here the top layer of soil is well above freezing, like around 70 degrees F. In retrospect, given the thinness of the atmosphere, this isn't so surprising, but I wonder what it does for the chances of liquid water being found?

LANDIS: Well, Pathfinder landed in the tropics, you have to realize. That's why it's so warm. The next mission will hit the edge of the polar cap. Now, that will be cool.

MCCARTHY: I've been talking to the Mars '01 team. That will probably be my next opportunity to work on Mars stuff firsthand. But I was touring the control center for Mars Global Surveyor the other day. The MGS team is really busy right now, about to go to 24-hour staffing because they are less than a month from MOI [Mars Orbit Insertion]. They look like they're having fun, and of course those instruments are all spares left over from the Mars Observer program. So I do feel some proprietary interest in that mission!

LANDIS: That's another mission that is paving out a radical new technology — aerobraking. Of course, Clarke used that first, in 2010!

MCCARTHY: Aerobraking was tested at Venus by the Magellan program — worked great. I doubt MGS will have any problems with that.

LANDIS: I hope not. But it's one thing to dip a little in the atmosphere with an old, used-up spacecraft, and quite another to rely on it to get you into nipping orbit with a brand new one!

MCCARTHY: Venus has a much thicker atmosphere, too.

LANDIS: Not the outermost part — Mars's atmosphere extends higher up.

MCCARTHY: You know, one thing that bothers me about these rover missions is that

while I really, really want to see what's over that next hill, I worry that the public will see that it's just another bunch of rocks, and then another, and then another ... How many piles of rocks before they get tired of the idea? That's one potential hazard of rovers.

LANDIS: I want to see the mountains up close! Especially some of the ones way off in the distance — Misty Mountain. That would be exciting!

MCCARTHY: I want to see the mountains too. The other problem with all the smaller/faster/cheaper stuff is that it's the exact opposite of the technology we need to land humans.

LANDIS: Not all of it.

MCCARTHY: Can you elaborate?

LANDIS: On 2001 we're planning on flying a technology test, and the technology we're testing is making liquid oxygen on Mars. Liquid oxygen is the better half of rocket fuel. What I want to do with the rocket propellant once we make it is to fuel a little rocket with a camera in it. Then we'll have some neat pictures.

MCCARTHY: Oh, absolutely, we can test out all that stuff. We can make cement, water, rocket fuel, glucose, and probably even plastic with just the gases in the Martian atmosphere and a handful of small, cheap machines that we land there. The problem is that even if we remotely build a whole Mars base, or even an entire city, you still have to launch a bunch of people. People are a lot heavier and more delicate than Sojourner rovers. We're getting really good at sending small stuff, but human cargo is bulky, heavy, and requires very special handling.

LANDIS: I don't think that people are all that hard to get to Mars. Getting them there is relatively easy. It's getting them back that's hard.

MCCARTHY: That's the kicker. Of course, we can land a return vehicle and have it fully fueled up and waiting when they land. That's the bonehead solution.

LANDIS: You have to send to Mars a whole interplanetary launch capability. The slick solution is to fuel it there.

MCCARTHY: Right. But even so, feeding and supplying a group of humans for a journey of months is no small matter.

LANDIS: Sure it is. We know how to do food and water.

MCCARTHY: Look at the problems on Mir! **LANDIS:** Mir has been up for almost two decades. Although I have to admit, that if I were doing it, we wouldn't go to Mars. We'd go to Deimos and Phobos first, the moons of Mars.

MCCARTHY: In an energy sense the Martian moons are more accessible than

our Moon.

LANDIS: And also there are some very provocative scientific results that suggest that Deimos and Phobos contain water.

MCCARTHY: That's a nice feature. But still, you have to drag a life-support system all the way out there. Unless you could put the crew in hibernation. There's a technology I wish NASA were investing more effort into!

LANDIS: Why bother with hibernation? Mars is only nine months travel time. We know how to do nine month's in space.

MCCARTHY: I eat a lot in nine months.

LANDIS: Maybe a few kilograms a day. A thousand kilograms in a year. Not a big deal.

MCCARTHY: I breathe a lot in nine months. Things can break down in that time.

LANDIS: You can make oxygen on Mars, or you can bring it.

MCCARTHY: Compared to a Pathfinder lander, it's plenty big.

LANDIS: Compared to the tons of rocket fuel you need to get from Mars to Earth. Will the food and oxygen you consume on the trip is not a big item.

MCCARTHY: Oh, absolutely! I'm completely convinced that the so-called in-situ resource utilization schemes are the way to go. That cuts the mass you have to ship 100 down. But still, you have to ship a lot of mass. A lot more than for a probe. I say we colonize Mars right now. Don't fool around with landing and leaving and landing and leaving. Just go.

LANDIS: Of course, when we colonize Mars we'll have to learn how to grow food! Deimos and Phobos are very interesting waypoints. You don't land on them so much as just sort of rendezvous with them.

MCCARTHY: Growing food will not be so tough — except for a few things like nitrogen and phosphorus. Well, there's nitrogen on Mars. The Martian soil looks like pretty good growing soil. Leach the salts out, fertilize it (just like we do here on Earth), and the plants ought to grow.

LANDIS: Well, there's nitrogen on Mars. Lot of sulfur, though — Mars soil might be kind of stinky.

MCCARTHY: Soil's a little acidic, I guess, which can lead to aluminum toxicity; there is a lot of aluminum, too. But these problems are faced all the time right here on Earth. Getting plants to grow is something humans have a lot of practice at.

LANDIS: I think that science fiction may be part of what has changed the way that the public looks at Mars. Between Mars Observer and Pathfinder, there have been at least a dozen major novels featuring Mars. *Green Mars* trilogy, *Mars*, *Beneath* — SF has made Mars exciting, even sexy.

MCCARTHY: You think the general public is reading these books?

LANDIS: I think SF is helping change the zeitgeist.

MCCARTHY: Yeah, that's what SF is supposed to be for!

LANDIS: Kim Robinson was even featured as a Mars expert in the *Newsweek* article.

Have you ever written a Mars story?

McARTHUR: Actually, I just put the finishing touches on one the other day, using descriptions of the sunsets and cloud formations seen by Pathfinder. So science is definitely influencing science fiction!

LANDIS: Did you include a blue sunrise?

McARTHUR: My understanding is that the blueness of it is not apparent to the naked eye, so no, I didn't. But I talked about the "fountain" of radiance you see above the Sun. That's a strange thing, not at all like a sunrise on Earth.

LANDIS: One of the things I've been looking for in some of the Pathfinder sequences is a morning halo. The high ice clouds ought to give you a halo around the Sun, very early in the morning. So far we haven't looked for it, but it will be interesting to see if it's there.

McARTHUR: Like a circular rainbow?

LANDIS: Yes, a circle of light around the Sun, with one edge red and one bluish.

McARTHUR: Well, while you're at it, send that rover to the top of those hills. If it's just more rocks on the other side, we can always suppress the images ...

LANDIS: I'd like to, Will, but I'm not a driver. Got to get one of those Mars drivers' licenses, I guess!

McARTHUR: One unfortunate fact about Mars is that solar energy really won't be able to fulfill our needs there.

LANDIS: Solar energy is powering Pathfinder.

McARTHUR: But to extract and hydrolize a kilogram of water from the atmosphere takes about 135 kilowatt hours. A photovoltaic array even at 2% efficiency would need about four months per kilogram. That's a long time to wait.

LANDIS: So go to the polar cap, and just melt the water right out of the ice. Or drill down for permafrost.

McARTHUR: You want to live at the polar cap?

LANDIS: Sure. The polar cap of Mars is a great place to put a colony, or at least a base.

McARTHUR: Well, look me up in the tropics.

LANDIS: Another thing that's raised the public's interest in Mars, other than Pathfinder, has been the Allan Hills Meteorite — the supposed fossils? It certainly has attracted public interest! It seems to me that they've made a very convincing case.

McARTHUR: It's definitely an unusual assortment of features, all found right close together. You've got PAHs [polycyclic aromatic hydrocarbons], small magnetite grains, little bumpy things that might be bacteria ...

LANDIS: We know Mars used to have water, we can see the dry riverbeds. If it had water, why not life as well?

McARTHUR: That there was water on Mars I don't think is really in doubt any more. But life?

LANDIS: On Earth, you find life in every niche that you can find liquid water.

Continued on page 96

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ABOARD THE
GENERATION STAR-
SHIP *CENTAUR*, THE
GENERATION GAP
WAS PUSHING THE
DISTANT PLANETS
OUT OF REACH.

THE TRUEST CHILL



BY GREGORY FEELEY
ILLUSTRATION BY RICK BERRY

Each day was like every other, the people from Social fretted, but for Suyin every day was another small step on a finite trail, another millisecond of arc. The names on the morning reports were never wholly new, but each problem bespoke progression, not periodicity: a malleable ado-

lescent now old enough to fall under the sway of a gang; a disappointed technician whose balked career was driving her into flirtation with radicals. Two people had died this year, and five been born; nearly eight hundred lives rippled slightly along many bundled trajectories, the paper sinuosity of a New Year's Dragon.



OR SUYIN, A "YEAR" WAS BUT A CONSTRUCT, THE
FRAME TO HOLD A LANDSCAPE OIL WHEN THE ACTUAL
WILDERNESS WAS EVERYWHERE AROUND HER.

Because her superiors were accustomed to reports on a quarterly basis and reviews on an annual one, Suyin knew this morning as the one hundred and ninety-fourth of a year that her wall calendar, hand-painted by Flora, designated that of the Rooster. But it was Shipday 5439 in mensural truth, a clockwork tick in a celestial mechanism that was arbitrarily calibrated but precise in its counting. Suyin, at least, knew where she was going.

The fellow on her screen was not going anywhere, although he did not realize this even now. His face bore the slack, uncharitably revealing expression of a subject unaware of the camera (no one on the Centaur posed for photos anymore, and Suyin had found his 14-year-old file image inadequate). Suyin studied it for traces of vanity, discontent, or recklessness it was, she knew, an idle effort; she resented the man because he was listening to the same people who were talking to Toshio.

Suyin looked at the resources available to her, not all of which were appropriate for this case. Gnats could cling to his clothing, recording what sounds reached them; but a suspicious subject could communicate through gestures and eyebrows, don coveralls or doff clothing to converse in a workshop or bath. Almost no subject spoke freely in his room or by mail; one of Suyin's colleagues hoped someday to identify who it was they heard from before abruptly discontinuing such practices. Planted cameras were harder, as they could look only in the direction they were pointed, and autonomous probes were expensive and risky. Suyin reviewed the options available to her, recalling that the subject would doubtless turn up on others' records, and decided that she could justify taking no further measures.

Her phone chimed, and she touched a panel to see her daughter's expectant, uncertain face. Suyin's phone disclosed the identities of outside callers before they realized it, a feature she was careful to disable when Flora visited her office. The girl's drawn features provoked a twinge of ambivalence: Suyin wondered what great drama now caused her distress even as she felt herself touched by it.

She touched the panel that established two-way contact. "Hello, dear," she said. "Have you finished your history studies?"

Flora's mouth twitched unhappily. "I've got serving duty tonight," she said.

"Well, that's fine, isn't it? I would rather serve finished meals than help plow their scraps into the tanks."

Flora looked as if such stupidity were a not-unexpected disappointment. "I don't want you coming in," she said.

Suyin did not betray her response, which combined amusement with a small pang. "All right," she said. "I'll eat up here." She forbore to remark that Flora had yearned as a child to serve dinner.

"Toshio called. He said he'll be working late tonight, and you shouldn't wait." She said this carelessly, but was watching for a reaction.

"Then I'll certainly dine up here," Suyin replied. Toshio was making a little point in leaving the message at home rather than calling her office, but Flora was just wondering if he was mad at her. Suyin wondered whether her daughter would outgrow this social obtuseness, which had not afflicted her at nine. She had been quite acute then, and as agile as she was ungainly now. Suyin recalled her own adolescence as considerably less weepy.

Flora scowled, as though realizing that she had given her mother a defense when next she chided her for taking a meal in the administrators' dining room, supposedly a redoubt of illicit privilege. "Be sure to smile at everyone," Suyin could not help saying, although it merely deepened her daughter's evident unhappiness.

Returning to work, Suyin looked at the queue of cases awaiting her attention, assembled like petitioners in a docket. The problem with dealing with political offenders on a ship like this, she thought (not for the first time), is that you cannot exile them. Perhaps Neptune should have been a planet for transportees—the new century's

Australia. She imagined the problems of a ship filled for its journey with nothing but convicts, for who would volunteer to manage them on their generation-long and one-way trip? Her own problems were difficult enough; the Centaur had not set out carrying political offenders, it was merely creating its own.

Suyin scanned the cases: twelve men, five women. Were males likelier to talk sedition and smash light tubes, or just more liable to be caught? The four with criminal convictions were all men, while those whose disaffection seemed broadly religious were evenly divided between the sexes. Policy dictated that malcontents motivated by any beliefs other than those incontestably criminal or political be considered religious, although several of her colleagues shared Suyin's conviction that some of the culprits more resembled the rebirth of Unreason.

"I know your mother," she told a glaring adolescent of seventeen (minors were imaged annually as part of their medical files) whose hair seemed chopped into deliberate asymmetry. "What must she be thinking?" Bo Chang was taking the minimum permitted course load for his age, and had petitioned (unsuccessfully) to have part of it waived. He worked in a filtration sub-station, where his efforts were considered unimpressive, and had been keeping the company of a group of slightly older punks who seemed to be engaged in buttlegging. Seeing the boy careening down a course set to wreck his life, Suyin felt like crying out. Why was age such an energy gradient, that knowledge could only imperfectly travel backward to a younger state, its signal weakened and distorted before an uncertain arrival?

She worked for four hours, reading through transcripts, pondering behavior patterns, writing recommendations. The Onboard had sophisticated tools for analyzing speech structures and the dynamics of group interactions, but Suyin mistrusted such parsings, which produced interesting results but could not finally describe human behavior. Annoyed at a fourth derivative that seemed to close on a point about peer groups she already knew, Suyin shut her desk with an exasperated sigh and pushed off her mail.

She ate by herself (most of the other diners were Greenshifters finishing breakfast) and rode back to her level feeling tired and slightly depressed. Flora had once been inquisitive and sociable, qualities Suyin tended to associate together, and now was neither. When she was 11 Flora had asked her mother why the Centaur had been so named, and Suyin had explained that the centaur was a fabulous creature common to both Eastern and Western mythologies, a fitting symbol for the spaceloom culture that derived from both civilizations. Half-an-hour later Flora had returned from consulting the libraries to report that the centaur had been unique to Greek mythology, and that the beasts shared by Asian and European mythologies appeared to be the dragon and the phoenix. Chagrined and slightly irritated, Suyin had explained why the phoenix was an inappropriate namesake for a ship, as was the ferocious dragon. She supposed that the ship's name owed something to its dual nature, part asteroid, part spacecraft.

Flora was still out when Suyin returned home, but Toshio was sitting in his armchair, browsing through the news. Pall gravitas always intensified Suyin's after-work fatigue; she found herself having to sit down almost immediately, and not on one of her restful mats, which offered no cushion against the hard floor's pressure. She touched the wall panel that inflated Flora's crashcouch, ugly as it was, and sank into it. "Hello, Toshi," she said. Toshio did not raise his eyes. "Good evening, Suyin." He tapped his reader once, and its faint murmur faded. "Have you seen the news today?"

Suyin saw little but news, though most of it never reached Toshio. "I don't recall anything remarkable," she said cautiously. "Something from Back In?"

"Only in a sense," Toshio set down his reader and looked at her calmly. "A fitter in Engineering was reprimanded for taking a maser outside. He was looking, on his own time, for the Black Ship."

"Oh, dear," Suyin had always been glad that particularly folly was not her responsibility. "And word got onto the nets and people are unhappy."

"Well, yes. A lot of them are angry."

Suyin could readily see it; enough people believed that a second

ship, dispatched long after the *Centaur* but moving faster, would overtake her and establish some sinister hegemony around Neptune and that any attempt to keep unauthorized crewmembers from taking valuable equipment outside would be seen as repression, perhaps conspiracy.

"So the nets are howling," she sighed. Or at least some of the nets were howling. The speed with which rumors could form, swell to thunderheads, and expend themselves in a blast of wind and fury never failed to startle Suyin, who remembered the great, looser nets of Earthspace, where you could communicate with people you never met, who lived in radically different environments, some of them light-minutes distant. Things moved slower there; one could wait days for someone to respond to a post, which might come squirting back from a station in the asteroids or the Galileans, where mail took a low priority in the transmission queues. Compared with those complexities the *Centaur* was like an isolated weather cell, every puff blowing back in your face.

"It would have been an easy enough problem to avoid," said Toshiro pointedly.

Suyin had guessed he was taking the protesters' side, but didn't want to be drawn into an argument. "Doubtless he'll have his appeal," she said tiredly. "Anyway, a reprimand is no great disgrace; he's not going to be fired or sent home."

"Better he were," Toshiro drawled, leaning back in the careless pose Suyin knew signaled aggression. "I suspect he'll have his career quietly ruined, a mark in some record he'll never even know about. Perhaps only in a file beyond even your reach, but decisive nonetheless."

Suyin felt a stab of pain in her temple. Changing gravity fields left her prone to headaches if she let herself become tense. "In a few years we're going to need every technician we have," she said, "even those convinced they've been marked for liquidation." She got up and headed for her room.

"Have you eaten?" asked Toshiro, seeing her face as she passed. "I didn't see you this evening."

"I ate upstairs."

"Ah," Toshiro's tone may have been significant, but Suyin didn't think about it. She lay down in the darkened room and began a relaxing exercise, flexing the structures of her mind into a state pliant enough to sway before buffeting forces. After a few minutes she heard the sound of a door closing in the room beyond, either Flora coming in or Toshio leaving. Her headache slowly receded, though the sensation of peace did not take its place. Suyin sought to make herself a vessel into which serenity would naturally flow. When she heard the door close once more, however, and again a minute later, she gave up and rose with a sigh.

Bringing up the room lights, she looked into her closet and selected a comfortable shift. When she returned to the living room, she found it empty.

"Flora?" she called, rapping softly on her daughter's door. She didn't expect a response; the three closings could only be Toshio leaving and Flora coming, then going.

Suyin touched the wall panel that alerted the Onboard. "Where is my daughter?" she asked. Toshiro didn't like her keeping track of Flora this way — he evidently wanted minors to be granted the privacy rights of adults, although he didn't seem to feel that adults should be treated like adults and held accountable for their actions — but had lost his chance to complain by walking out on her.

"Flora Ming is in the Woods," the Onboard replied.

Suyin frowned at this. The Woods was the largest public space in the ship, and was sufficiently overgrown to permit a range of unsavory behavior. Public safety monitors oversaw every corner — even Toshiro would presumably not object to that — so that flagrantly illegal acts were out, but any amount of stupidity was likely to go on, generally by youth who proclaimed the *Centaur* a police state yet acted as though they were in a Free Zone on Earth.

Suyin kicked off her slippers and pushed her toes into her walking sandals. "Apprise me if Flora leaves the Woods," she told the Onboard. Even at its best the system had been an unreflective idiot,

incapable of drawing inferences; and its present state had scarcely more brains than a suit unit. It was perfectly capable of monitoring Suyin as she searched the Woods, then informing her (once she thought to ask) that Flora had gone to the tea garden.

The pip that opened up contained a young mom from the nurseries below, nodding her head in time to some tinkly classical tune from the last century. "Ah, sorry," she said as Suyin stepped in, and moved to touch her belt.

"Oh, leave it on," said Suyin absently. The first second was the worst: a surge of more-than-local gravity as the pip resumed its ascent, then a steady weakening as they were hauled back in toward the ship's still center. Elbows touching, Suyin and the mom rested their backs against the counter-spinward wall, which pressed against them like an acceleration couch as the pip shed spin velocity. Suyin smelled a faint cologne; the mom, her shift over, was heading Up to socialize.

"Have a nice evening," Suyin said as she stepped out on Level Two. The mom, bound for more adult quarters on a higher level, smiled gratefully. Lightfooted once more, Suyin left the concourse in a few lunar bounds and grabbed a handrail for the Woods. On higher levels railers could simply hang in near weightlessness as they rode through the low-ceilinged corridors, but Two had too much gravity for such exertions, so provided a running board for one's feet. Suyin tightened her grip and was quickly pulled along, flexing her legs — her arms at least were not tired — before resting them on the board.

"Which sector of the Woods is Flora now in?" she asked the Onboard as she touched a belt stud.

"Beech Grove," said a tiny voice in her earring.

"Who is she with? Oh, cancel," she added before the Onboard could check her authorization for this mildly irregular request. She would find out in a minute anyway, and could work better from a set of living faces than from a list of names.

The Woods was wide enough to disclose the deck's curvature, creating an inverted horizon of mottled green. Sections of the park sported high ceilings, creating a space where baobabs, hillocks, and even a waterfall offered a sense of landscape, like the gardenized courtyard of an Earthside ecology. Structural posts sprouted at regular intervals like trees, thick with twining vines that rippled in the odd breezes. Suyin glanced at the nearest one dourly: Had the fools who designed the ship done their job properly, they would all be orbiting Neptune today, embarked upon a thirty-year settlement schedule they now would never overtake.

A breeze wafted the scent of cut grass and earth to her nostrils, startling her. She had certainly been to the Woods since the days she had brought Flora here to see the carp in the pond, but she couldn't think of when. There had been more time, then, despite the fact that her labors as a junior administrator had consumed her days and nights, and Liu had sat up studying with Flora on one knee until Suyin came home exhausted. Ducks had floated on the pond, looting themselves on implausibly slow-flapping flurries and releasing green droppings in leisurely arcs that children screamed and ran from. Where were the ducks?

The Beech Grove was far off even of this entrance, and so far to spinward as to lie above the horizon. No rail hugged the park walls, so there was no way to proceed but on foot. She bounded lightly, rather enjoying the resilience of the turf. A group of children shouted and ran down a shallow slope, watched by a pair of aunts who sat on a blanket.

Suyin had expected to see Flora long before she reached her, but the stand of beeches proved to be surrounded by a dense growth of saplings, like a haze of vertical pencil strokes, that blurred the outlines of everything beyond. Bereft of leaves as if thinking it winter, the ungainly stales had either shot up in the low gravity (some plants did this) or had been cultivated for rapid growth. They looked like outsize weeds, though Suyin reprovingly, as though the Woods too had slid into neglect and disorder.

Voices reached her as the breeze shifted, low murmurs that sounded distinctly furtive. Suyin paused, straining to discern a girl's voice in the susurris. The voices faded with the breeze, but a second

later (as the heavy particles of a solar flare will follow by minutes the radiation burst) an acid odor touched her nostrils, which she recognized immediately as tobacco.

Without hesitating Suyin crashed through the brush, which clattered as it gave way like a bamboo bed being smashed. She imagined rather than heard the startled silence ahead of her, for when she burst free of the impeding stalks — emerging suddenly in the grove's shade — there was a flurry of activity among the youth huddled at its center. All of their faces registered surprise, but Flora's gaped in a round zero of shock.

"What in hell are you doing?" Suyin demanded. "Burning cigarettes in your poor neighbors' air? Perhaps you spit in our gardens as well?"

Something stronger than the faint odor of smoke rolled in the cool air. Suyin looked down to see damp compost underfoot, evidently kicked up to release its rotting perfume.

"Fooling the sensors, eh?" she said, professional interest overriding distaste. It would work, too, with the ceiling vents far overhead. She wondered how long this trick had been used.

Her swift offensive had cowed them — a good thing, as her rapidly adjusting eyes now perceived them as apparent toughs, two wearing daubs of color on their cheeks and jagged metal earrings. The nearer one, looking resentful, opened his mouth to protest, and she rounded on him.

"Don't you say a word, Yin Yimou. If your father heard you talk back to an elder he would knock you to the ground." Yin shut his mouth with a snap, looking as if he had been slapped by an invisible hand.

A boy to his right shifted his weight uneasily, releasing a tiny curl of smoke from the loam beneath his boot. Suyin pointed disgustedly. "If your clumsy attempt at concealment starts a fire, you will be charged with a felony."

One of the boys exclaimed in alarm — more in horror of the prospect of a low-gravity fire, Suyin hoped, than in concern for his file — and two of them began kicking at the smoldering loam. Suyin looked across their hunched figures at Flora, who gazed back furiously but said nothing.

The situation was not a stable one; although Suyin had thrown them off balance twice in a few seconds, the advantage could swing against her almost immediately. Suyin wondered what Flora would do if her accomplices became menacing.

There was no need to find out. "There's dry brush underfoot," she snapped, "and you've kicked it into a mess." She pulled out her pocket pal. "I'm calling Fire Control. Get out of here or they'll take your names."

The kids fled, springing in every direction like startled grasshoppers. Flora paused, but someone called her name, and she threw a last glance at her mother before turning to run. In seconds the sounds of their footfalls were swallowed by the muffled earth.

Holding her pal, Suyin considered. Reporting an open fire, or the cigarettes, would require a report. She settled for calling someone she knew in Parks. "I'll turn on the sprinklers," he told her. "Soak the groundcover, also drive those punks out if they're lingering at the edges. You sure you're OK in there?"

"They won't bother me," she told him. "Just give me a minute to get clear."

Striding across the open field, Suyin wondered where Flora had gone. She could find her through the Onboard, but knew that for a bad idea. Flora would certainly have guessed that Suyin had tracked her into the Woods, an affront that Suyin's subsequent intervention would only (in her daughter's eyes) compound. She wondered where the tobacco was being grown. Nicotine synthesis seemed beyond the capabilities of the leggers, and the existing fabricators were strictly controlled. Tobacco culture was a mystery to her, although she might have to learn.

Standing in the concourse, Suyin felt herself mildly depressed. Toshiro's antipathy had obvious causes, but Flora's was simply incomprehensible. Now, of course, Suyin had certainly provided a rationale for a resentment long in search of one, like a gathering electrical force at last achieving discharge.

And where was Flora now? Surely not home, and probably not off by herself either. Suyin thought of Flora's loutish companions, scared and resentful, finding some other spot where they could light up. In such company Flora could be led into deeper imprudence.

Suyin could not interfere, but she could inquire. She took out her pocket pal and asked where Flora was. In a tiny voice the pal told her that Flora Ming was in the spinward-aid corner of the concourse.

Turning in surprise, Suyin looked across the high tiled space. The far corner was empty save for a trash receptacle. Suyin frowned, then suddenly understood. With a wrench, as though something had torn loose in her chest, she realized that Flora had broken off her bracelet — illegal for a minor — and thrown it into the container.

To her astonishment, Suyin began to cry.



OSHIRO CAME IN WHILE SHE WAS SITTING UP NURSING A CUP OF COCOA LACED WITH CINNA-

MON AND VANILLA, A VERY CANADIAN DRINK.

Probably he had expected to find her asleep, but composed his features to hide any dismay. In truth, she was surprised that he had come back at all.

"Waiting up for me?" he asked, perhaps ironically. The problem with ironists was that they used their beloved tool both fondly and for its edge, so that one never knew precisely what they meant. Eventually they realized that they needn't know themselves.

"Coming back for me?" she countered. Toshiro's gaze flicked across the room, then back, too quickly, Suyin turned without thinking, and saw his favorite book resting on the sideboard, a small soft covered volume like a 20th-century paperback. She turned back, face carefully composed.

Toshiro's face flushed red, a bad trait in a man born for secrets. Awkwardly he said, "I thought you would both be —" and stopped as he saw something past her. Suyin did not look; she knew that Flora's door stood open. "Oh," he said.

And so each now knew why the other was here.

Suyin was in no mood to be left again. "Sit down," she said, reaching to lift her own book off the chair opposite. She instructed the cocoa service to prepare another cup as Toshiro sat warily. Deceiving to heat fresh water, the antique service vented steam with a sputtering sigh. "Flora hasn't come in?" he asked.

"She returned only to change her clothes. Went off to the Woods, where she was caught smoking with a bunch of friends." Suyin adjusted her cushion nervously and sat back. "When I arrived, she ran off."

Toshiro grimaced. "And where is she now?"

"I don't know."

He grunted. "Sounds like you're learning." Then, as though ashamed, he asked, "Is she in trouble?"

"No, nobody knows but a Parks supervisor and me."

Toshiro nodded and sat back, thinking. "Cigarettes, eh?" he said. A faint smile quivered his lips.

"It's not funny Toshi. This isn't some antiestablishment jape: smoking stresses life support, and encourages people to put their pleasures ahead of the public good. And buttlegging is disgusting. The Ship's gray economy is fragile and corruptible enough as it is."

At this Toshiro grew thoughtful. "Marketing cigarettes, not just cooking up a few to pass around? That takes some determination."

Even through her irritation and her larger dismay, it occurred to Suyin that Toshiro's opinion on such matters might be worth knowing. "How so?" she asked.

"Well, nicotine synthesis is easy enough, though I'm not sure what a bunch of leggers would do with a colorless, toxic liquid. I can't see them doping derms or sprinkling it onto their food. Tobacco synthesis is a good deal harder, and I don't know how else to get a smokable product. You certainly can't cultivate the stuff."

"No?" Suyin remembered an image of long rows of the big-leaved plant nodding in lunar greenhouses, something from an old file or

show. Perhaps the plant grew too slowly, or big, to hide among the Centaur's cramped farms.

"They've probably either grown immature plants, which will taste poor, or are sleeping some other vegetable product. As soon as some kid is brought in with ricotine poisoning, you'll know."

The cocoa service chimed softly, and Sugin turned to it. Toshiro's favorite cup was on a shelf below, a Shino tea bowl, five hundred years old, that had been recovered in fragments from a wreck and reconstructed using microceramics. Its deep discoloration bespoke centuries beneath Lake Nojiri, and made it a monstrosity to collectors. Sugin knew of intact Seto ware on board, whose owners would be aghast at the thought of this glued corpse, used for chocolate by a man like Toshiro. More ironies shimmered here, Toshiro their appreciative connoisseur.

Sugin filled the cup, letting the rising foam touch its rim. When she turned, Toshiro had a small flask out. "Bootleg bourbon," he said with a smile. "Gray market at best. I say this freely, since investigators' rooms aren't bugged."

Sugin scowled as he poured, wondering whether he was trying to test some limit or just being insouciant. Whiskey fumes filled the room, aromatic with chocolate. Toshiro held up the flask. "A splash?"

She looked at him irritably, then felt the fumes spread through her sinuses, caressing her nerve endings as though inviting her to abandon her tense yet tired state. "Oh, why not?" she replied, holding out her mug.

"The opium of the people," said Toshiro, pouring. Sugin's mug was nearly empty, and he added a good dollop.

"The people," said Sugin sourly, taking a sip. The top layer of liquid was almost pure whiskey, and she coughed in surprise. Eyes running, she found a spoon and stirred. "You make them sound like the underclass."

"They are the underclass." Toshiro was looking at her seriously now. "An entire proletariat created at a stroke. The development of Earthspace culture produced a social class estranged from the sphere of collective action, taking the *Centaur* out of the solar economy created the conditions for their enslavement, and a return to colonialism as well."

"That's nonsense," Sugin was brisk with such matters. "There is no proletariat in space; every living person off Earth is a trained and educated specialist. Where is your ruling class — living in fortified estates on some unmarked level? Where are the secret police, the suspended constitution, the political prisoners? It's only the fact that our government is open and painfully just that permits us to live in such crowding."

"Don't delude yourself, Su. Indentured workers are everywhere in space. Those wretches who call themselves the Second Lunar Republic are a disenfranchised laboring class, forced to sign an agreement that they don't even own the air they breathe as a condition of working at all. The Galilean Labs impose contracts on their researchers that amount to vows of poverty, which young graduates fight for because they feel it puts them at the forefront of science. In fact, this 'science' enriches a cartel in which they have no part. Everyone is carefully told how their habitat's wealth is publicly owned, so nobody minds that they possess nothing, control nothing but their own lab experiments."

Toshiro had a cocoa moustache, a bright amber ribbon that reminded Sugin of some earnest teenager's painted rebellion. Patiently she said, "There is no wealth to be created by settling Neptune. Trade is impossible: You couldn't export plutonium over that distance, let alone methane. It's all being done for more complex reasons than your preoccupation with material wealth, which mostly translates, anyway, into solar energy and heavy elements. Seen much of either out here?"

Toshiro shook his head sadly, a gesture that suddenly infuriated her. "Nothing is more complicated than Man's desire for power over others, however crude it is at bottom. Neptune is the last outpost before the Deep, a trillion comets and worldlings. Would you bet that humanity will never seek to claim this immensity? The *Centaur*'s masters bet otherwise; we're the bet."

"Of course this expedition will establish a foothold in the Deep. That doesn't make it an exploited asset." Toshiro's unsuspected moustache disabled her vexation; he looked like some parodied revolutionist: Dominguez, or was it Stalin? Sugin licked the corner of her napkin and leaned toward him.

He flinched away, raising a hand to block her and wiping his mouth irritably. "For Christ's sake, Su, look around you. Half the ship's children can scarcely read; they're fit for nothing but taking orders. A generation created to carry out the plans that their parents brought, and they know it. They haven't the wit to do more than break lights, and your masters use you to control that."

Sugin drew back, shocked and hurt. Toshiro's expression shifted, whether to register dismay she could not tell. Trembling, she set down her cup and stood.

"Do you really believe that? Not that it matters." Sugin stood and headed for the door — not, sensibly, the one to her room, to which retreat seemed suddenly intolerable, but through the front door, which clicked behind her with awful finality.

She strode up the corridor in a deepening rage, unmindful of an auntie who stared at her expression. Waiting for the pip she stood erect as a statue, but when the capsule drove her sideways she crumpled, weeping in her solitude more in fury than sorrow. Why do the baldest cannibals make one feel unclean?

In her office she composed herself, opening her desk and considering the particulars of her self-exile. Toshiro would certainly soon leave her apartment, uneasy at having driven her from it, and she could reclaim her bed unobserved. Her fingers moved across her desk, then stopped. An image suddenly came to her: Toshiro lying in his dormitory, saving his restive conscience with the thought of Sugin confirming his location before venturing back. The idea stung, and Sugin was seized by the abrupt conviction that Toshiro would know when she checked his whereabouts.

She pushed herself out of her chair, unfolding her legs slowly in the faint gravity. Toshiro would have his satisfaction, but it would be unearned. Opening a wall compartment, Sugin drew forth a netted hammock, another gift from Flora. In low gear all beds are comfortable.

She strung the hammock between adjacent walls, wondering what her supervisor would think of this arrangement. Undressing in her office felt awkward, as though she were engaging in one of those furtive trysts she knew took place in monitored cubicles. Lying in the dark, Sugin wondered where Flora was. Their apartment, she feared, stood empty, both women having forsaken their beds in unhappy gestures. Men were self-destructive only on a bigger scale; they at least would be sure to sleep comfortably.



HE WOKE EARLY, FEELING VAGUELY OPPRESSED BY THE SENSATION OF HER ANKLES TOUCHING, AND ASKED THE ONBOARD FOR SOFT MUSIC.

No calls showed on her phone, which she could not identify as either good or bad news. Sugin dressed without calling up the lights, out of some obscure impulse, and showered in a facility used by farm workers one level down. A shift change had filled the room space with muscular bodies, and she walked quickly to the nearest open nozzle, hoping the steam and spray would shield her from general notice.

"... or a radar sweep," a woman next to her was saying. "Send out a quick pulse from one of the aft transceivers during a second of downtime. No transfer of hardware or unauthorized sorties."

"Um," said another farther down.

"They could pick it up," called a third person on Sugin's other side. "The instant they detected the pulse they would send an alert to the *Centaur*. The Onboard could track down the source in microseconds, erase the reading before the operator could see it. The event would unhappen before human eyes perceived it. Isn't that right, Martha?"

"Maybe," said the second woman.

"Shit." The woman next to Sugin was silent for a moment. "Perhaps

SHE STRODE UP THE CORRIDOR IN A DEEPENING RAGE, UNMINDFUL OF AN AUNTIE WHO STARED AT HER EXPRESSION. WAITING FOR THE PIP SHE STOOD ERECT AS A STATUE, BUT WHEN THE CAPSULE DROVE HER SIDEWAYS SHE CRUMPLED, WEeping IN HER SOLITUDE MORE IN FURY THAN SORROW. WHY DO THE BALDEST CALUMNIES MAKE ONE FEEL UNCLEAN?

a robot package, released during an excursion, that could drift some distance then begin looking? It might —

"They'd see it. Be watching us, wouldn't they? Fry the thing with a pulse, we'd never know what happened to it." Nobody replied to this. Suyin, who had suspected that Marissa was keeping quiet in her presence, bent and began scrubbing between her toes.

Shower time was metered, and nozzles around Suyin, having evidently been turned on together, began shutting off. She listened as the women, complaining of sore muscles and wondering about supper, strolled away to the dryers. One of them giggled as she passed, and Suyin, looking down quickly, was horrified to discover the hammock pattern imprinted on her hip and backside like some restraining mesh. Even in the hot shower she felt a blush rising to her cheeks.

Suyin made tea in her office, where she inquired after Flora's status. Her daughter was in class, the Onboard replied; she had reported her ID lost in the Woods and been issued another. Suyin smiled wryly at Flora's perky, pleased that she knew how to cover small lapses.

She pushed into her morning's work, but found herself thinking fondly of Flora, who had been precocious in exploring data systems. Holding the small girl in her lap, Suyin had shown her the history of Neptune, or rather the history of humanity's image of Neptune, which may (she thought now with chagrin) have been a bit rarified for a seven-year old. It was only when Suyin placed two images of the world, one pale green, the other the striated blue of the *Centaur's* imagers, next to each other that the girl seemed to show interest. "That's the old Neptune?" she asked, pointing.

"No, dear, it's the way people used to think Neptune looked," Suyin winced at the memory.

Flora seemed bemused by the distinction, and soon slipped off Suyin's lap, doubtless (she thought) never to consider the matter again. But an hour later Flora returned, triumphant. Asking the Onboard to give her references to "Green Neptune," she had come up with a wall full of citations, some dating from the 16th century. "I even found the year," she said proudly.

"What year?" asked wondering Suyin.

"When they found out." And her chubby finger pointed out a line: "Thou mighty one, that with thy power hast turned Green Neptune into purple"

It was dated 1613.

Mirthful, bemused how to explain, and (even then) vexed with herself, Suyin had nonetheless felt swelling past these a surge of pride sweet beyond any gratification of her own ego, the unalterable conviction: My daughter is a genius.

And so perhaps she was, if a community isolated as a prison colony, starved for energy, depressive and frayed, had not blunted the edge of every child in its underpowered classrooms. No wonder they tried to turn the park into a badlands, the stairwells a no-go zone. Even Suyin, who grew up on the Moon, had tried once to run away from home; what borders could Flora cross but social ones?

When Julian called her to his office, Suyin felt only mild curiosity; like other administrators, he read enough reports to value direct contact when possible. An earlier configuration had actually given him a waiting room, whose vanished outlines Suyin still imagined as she sat in his simple chamber, which had managed to absorb a bit of that annexed space even as it was divided up. His desk was a slab of real wood grown from a tree, coated with a laminate so thin that Suyin could run her finger over it and feel the grain. When Julian toyed with, then set down, one of his keepsakes — the one now on his desk was a favorite, an old stained inkstone — the tap of object upon surface seemed to possess a solidity known nowhere else within the hull.

"Your colleagues report unusual traffic on the nets," he said mildly, as though offering up a pleasantry.

"More talk about the Black Ship, perhaps. I overheard a discussion of it this morning."

"There also seems to be discussion of that novel, *The Trench Chalk*. For a drama that comprises a mere trail of words, it has attracted much talk, and even some actual readers."

"The appeal of the forbidden," said Suyin, shrugging. "They imagine the work subversive, so some will take a peek."

"They soon shall be more than just peeking. You heard how the text reached Earthspace a few weeks ago, about the time that chapters first began circulating?"

Suyin nodded warily. Julian asked rhetorical questions only as prelude to a surprise, as if to permit his interlocutor a moment to take breath.

"The novel was disseminated through Earthspace, an interesting curiosity. However, a videodrama was quickly produced, and has become enormously popular, a best-seller." Since the design of the *Centaur* and profiles of its crew are public knowledge, an impressive degree of verisimilitude was achieved."

Suyin blinked at this. The lurid tale of the *Centaur* deteriorating slowly into systems failure, its oxygen levels falling and corridors going dark as civil order collapsed into barbarism, had seemed an irritant on the nets, a dismal hypothetical scenario like an exceptionally verbose net letter. Turning it into a drama, however, had some potential for mischief.

"Can it be imported back here? I wouldn't want to see the destruction of the *Centaur* playing on the walls of every disaffected viewer."

Julian opened his well-manicured hands, as though to display the emptiness between. "We can hardly prevent it. Transmission costs are borne by the sender, and if someone wishes to beam the show to us, we can hardly refuse it."

"Public safety? Libel?"

He shook his head. "The videodrama contrives, I am told, to present an unflattering portrait of the Ship's command and governance, and it would ill serve us to be seen trying to ban it. Such an effort would moreover be futile; the show would doubtless be divided into 10,000 bits and smuggled in with the daily mail."

"Of course," Suyin sat back and thought. "How long has the thing been loose?"

"About nineteen hours. I would be surprised if copies did not reach us by the end of next shift."

"I see. Well, sir, what would you like me to do? I doubt anyone will send a copy directly to the author, so we won't identify him readily. The dissident elements onboard will doubtless promote the work, if they do, through their usual anonymous channels."

Julian favored her with a sad smile. "You have not yet read the novel, have you? As a work of art it is deficient, but it has its documentary power. The author does not trouble to invent characters in key positions, relying instead on personal familiarity with the actual figures."

Suyin looked at him steadily as a crumbling vacancy formed within her stomach. "Are you telling me, sir, that I'm in this book?"

Julian winced slightly, as though Suyin had nudged a fine point. "The author does not use names — if I didn't know better, I would call it a literary device — so exact identification is impossible. But one of the administrators, identified as a security agent assigned to spy on dissident crewmembers, would remind most knowledgeable readers of you."

Suyin sat silently for a moment, trying to digest this shock. "How long is this novel?" she asked at last.

"About 110,000 words."

Suyin had forgotten that novels weren't measured in minutes. "I will have to read it," she said huskily.

"That might be valuable. He has been conducting a stylistic analysis, and thinks he has found correlations with some anonymous post-ages, though that may lead nowhere." Julian looked at her more closely. "Suyin, I don't believe you have caught the implication of this video-drama. It is, I am told, cast entirely from images of actual crew. Much of its popular appeal derives from the sight of Captain Yu and other recognizable figures ordering reprisals or being killed. Even the minor characters have faces corresponding to those in the Ship's roster."

Suyin felt peculiarly dissociated from the conversation. "You haven't yet seen the show. You don't know for certain that I am featured in it."

"I haven't seen it, no. But I have read a detailed memorandum on the situation. I felt you should know about this before any word reaches the nets."

"But this cannot be permissible!" Suyin cried. "The personal autonomy laws — surely strangers cannot put an individual's face and name to one of their electronic images."

"I'm afraid that the crew of the *Centaur* are considered public figures, so do not enjoy the protections of private individuals. And since the video is presented as fiction — it could hardly be taken as anything else — there is little chance of enjoining its distribution." Julian sighed, perhaps a trifle impatiently. "And we cannot, for the reasons I have explained, even explore the legal possibilities of this."

"No, I see that." Suyin felt slightly sick. "I will speak with Ho, and watch the nets. Thank you for telling me."

But in fact Suyin spoke with no one. She sat in her office shaking, feeling herself under attack by unknown forces on a field she could not defend. An inquiry to Communications told her that the Ship had received no long transmissions on its general traffic frequency in recent hours, and a check of the net library showed that very few users had accessed the copy of *The Truest Chill* archived there. This last surprise was probably explained by the fact that the novel's prospective readers tended to distrust the integrity of the archives, assuming that troublesome texts would be expurgated or their readers noted. In all likelihood the text was now circulating by hand, a reader chip passed like a note in class.

Suyin activated the Onboard. "Name a novel of approximately 110,000 words that I have read."

The system considered. "*Chrysanthemum Worlds* by Jasmine Faruko."

It took Suyin a second to recall the novel, which had been assigned in college over 15 years ago. She could not remember whether it had seemed a long book.

"Does the text of the novel *The Truest Chill* by Anonymous contain a character named Suyin or Ming?"

"No."

Asking the system to identify the character who resembled her would require Suyin to call on higher order functions than she was normally authorized to use, and she could not bring herself to ask Ho where this humiliating parody could be found. After a morning of anxious and distracted work on other matters, she called up the novel and looked through it.

Suyin could not judge whether the book was well written, but the author plainly knew the workings of the *Centaur*. It begins five months ago (all the chapters were dated), when a life-support engineer notices some anomalous readings in a part of the oxygen cycle that suggests poorer yields than the records were showing. A second chapter followed the rounds of a structural designer, who is hiding a problem from his young apprentice.

Suyin skimmed the subsequent chapters, which offered little challenge to interpretation. Any reader familiar with the *Centaur* would understand the author to be saying that the Ship's data were being doctored — a dissident commonplace — to hide the fact that the damage sustained in the Jovian crash was more serious than the common crew realized. She jumped to the middle of the book, where the crisis was in full throes: A thermal enrichment project has failed to sustain plant growth, and the oxygen cycle grows progressively

smaller, like a closing cinch. Portions of the Ship are shut down as the volume of usable air decreases, and nonessential personnel are counseled to remain as inactive as possible. Darkened levels fill with distraught crewmembers, and a riot breaks out.

Suyin felt that she had passed the point she was seeking, but paused over the extravagant descriptive passages the inner levels, filled with some inept but hardly strain of tailored lichen, transformed into a scene of jungle warfare as crazed individuals, slowly starving in their diets of useless cellulose, hunt the Ship's officers and each other through the darkened corridors while the lights slowly dim and the air cools. She thought she recognized more than half the characters, whose portraits ranged from the clinically precise to the satirical. They possessed a gleeful intimacy, she thought dourly, only possible from someone who had lived among their models for 14 years.

She banished the work with a gesture. It was sufficient for her duties that she apprehend the novel; she need not track down her own etched miniature.

After a while Suyin remembered an internal memo on the novel and retrieved it. Ho discussed the work's authorship — probably a single individual, perhaps drawing on contributions from sympathetic friends — and its reception in Earthspace, where commentators were duly noting its angry hyperbole and affinities with the Cantonese "newspaper" serials popular 20 years ago. He discussed the possibility of the work being adapted to video and even as an extended virtual Moment: Death on the *Centaur*. Suyin shuddered at the thought, glad that so massive a transmission would not likely reach them.

She emerged from the memo to find a letter in her queue: Flora would be serving dinner again tonight. No word from Toshiro. Suyin did not know if her daughter was accumulating worktime as a gainful credit or merely trying to avoid her. Shaking her head, she made a date to dine with an elderly friend in Pollux.

Walking the circumference of a ring corridor in order to avoid the flipflop of a pip ride across the Ship's axis, Suyin caught sight of a slouching adolescent, lower face disguised by a spore filter, strolling with a gut she recognized from last night. Goggles and filters, she thought, have become the face paint of the on-duty class. As Suyin studied him, while still a dozen yards away the boy caught her gaze and started in shock. Lowering his head so his goggles winked at her, he turned a corner and disappeared.

All conspirators should be so transparent, Suyin thought with satisfaction. She strode on, entertaining a fantasy of the more determined seditionists betraying themselves with furtive displays, but was brought up short when she noticed a young woman on a bench pointing her out to her companion. They exchanged words, then both began laughing.

Suyin felt her face burn. She passed them without a sideways glance, trying at once to match their faces to names and to think of something else. A scrap of sound may have been a mirthful murmur, but the hallway acoustics warped it past intelligibility.

"Don't worry about it," said Angela Cheung, waving her fork dismissively. "We've lived inside the same walls for fourteen years, and nothing goes over anyone's head any more. If I found a fat-assed cartoon of myself on a wall and later noticed people giggling at me, I might be irritated but wouldn't be shocked."

"There are some differences here," said Suyin, a bit sultrily.

"Not really," said Cheung. "Someone has drawn your portrait, lampooning a characteristic trait. 'Small and round, Cheung could be considered fat-bottomed by dint of mere tactlessness; Suyin hoped her own caricature had required stronger pigments.' You've been sharing the same bathroom with these people for half a generation; naturally they've learned your sore points. Forget it."

Cheung speared a tangle of sprouts with zest, as if still delighted to be eating in gravity. Suyin twirled her chopsticks, a looser pair from the commissary. "So many damaged people," she said. "Slowly deforming under stress. I have to follow the tracks of citizens who threaten the general good, but most of them aren't criminal or even stupid, they're just incapable of behaving rationally when someone isn't watching them. I spend my days tracking foolish, destructive people, and there are more every year."

"The *Centaur* as flying ashyura, eh?" Cheung was amused. "Very bad metaphor. So, think of the Ship as an office building, with several hundred people in it, who don't go home at night. Or a battleship: They had even larger crews, who rarely got to look outside. Only we're on a longer cruise than anyone ever took; no vessel in human history has taken more than three years to get anywhere, and you know? None ever shall again."

"Fluto-Charon?" asked Suyin. But she knew the answer: P-C would be settled by descendants of the *Centaur*, traveling in a small, fast ship. Not even the first trip to Alpha Centauri would take 15 years.

"It's unnatural." Cheung seemed to take pleasure in this pronouncement. "But people have lived under unnatural stresses ever since we ceased being hunter-gatherers. Most of the wretches in human history lived under the constant threat of starvation, pestilence, or death by violence. They lived frightened and brutalized lives, but the work got done. We, on the other hand, are creatures of history's greatest Enlightenment; we're just on a crowded boat."

"But we'll rally round when we reach Reversal?"

"Oh, I don't think that matters; do you? Encounter and settlement must be largely automated; I'm sure the Outboard was designed to handle orbital insertion if the entire crew was dead of mutated foot fungus."

"Angela, you amaze me." Cheung was born in Saskatoon, and had left Earth only as an adult. Her Canadian optimism had crystallized around the rim into a genial worldliness tinged with odd inquiries, such as her assumption that Suyin (whose grandparents had grown up beneath the tundra) was a temperamental conspirator.

"Don't be silly; you know we're high-risk freight. Be thankful we needn't worry about scurvy, starvation, hostile natives, or falling off the edge of the world."

"That author seems to worry." Suyin wished to know without looking or being told; to examine what had been said about her then put it away, like an informant's filed report.

"Oh, stop it." Angela's apple-cheeked countenance robbed rebuke of its sting; Suyin had probably sought her out for this reason. "To be portrayed as one who runs telling tales to adults is to be disparaged by a child. Are you going to let that bother you?"

Suyin blanched. "You said you hadn't read it."

"I haven't, but I followed some of the discussion, and someone had listed the characters who were plainly based on real people, along with the passages that made them identifiable. I scanned the list and saw you on it." She looked at Suyin more closely. "You really don't look well. This can't be the only thing bothering you."

Suyin blinked hard. "There are some difficulties at home," she said, her voice choked. The idea of telling Angela about Toshiro seemed ludicrous, contrary to natural law.

Angela seemed immediately to understand. "That can't be easy," she said, reaching across to pat Suyin's hand. "But this other nonsense doesn't make it worse. You have to remember these problems are distinct, and not let one seem to magnify the other."

Suyin nodded, snuffed unbecomingly, and allowed Angela to bring her another cup of tea before she finally stood to go. It was only outside the corridor that she noticed her pal winking at her belt. Possibly her summoner had asked the system to put the call in only upon her departure from the dining room; but she might simply not have noticed it. Certainly the face that appeared from the first wall screen she came to did not look to possess that kind of consideration.

"Suyin Ming?" He was a mid-level administrator in the bullpen's office, known to her by sight as everyone was known by sight. "Please come to Detaining as soon as possible. Your daughter is in some trouble."

F LORA WAS SITTING WITH HER BACK TO THE WALL, LOOKING DEFIANT AND FRIGHTENED.

She didn't look up at Suyin, who had composed an expression for dealing with the officials but felt it crumble at the sight of her unhappy daughter. The uniformed man who gestured her into his office glanced from one to the other in silent reproach.

"Flora Zhao Ming was apprehended four hours ago selling ciga-

rettes to a group of students," the official said as he sat at his desk. "The nature of her wares, and the students' testimony, suggest that she was acting as the seller for a manufacturing operation."

Suyin had been ready for something like this, but the news hit her hard. "Why was I not informed immediately of my daughter's arrest?" she demanded.

The man frowned. "Student Ming has been answering questions for peace investigators, although not as fully as she might. She cannot be released to alert her confederates while the investigation continues."

"This was no answer. Suyin began to speak, but was interrupted. "How long have you known that your daughter consorts with bull-leaguers?" he asked her.

The official had produced his weapon, not greatly less dangerous for being clumsily wielded. "Obviously, I didn't," Suyin replied crisply. "Last night I caught her with a group of men smoking in the Woods. I threatened them with arrest and they fled."

"And you didn't take your daughter in hand, so that she was selling cigarettes the next afternoon."

Suyin flushed. "Flora disappeared with the rest of them. I had intended to confront her after school today."

"I see." The official met her gaze for a long second. "It is regrettable you did not have that long."

It was an unimportant blow, tactically insignificant in the long exchange to come, but it struck home. Seeking to look back steadily, Suyin flinched. No ground surrendered, just an unmistakable register of pain.

Toshiro didn't come that evening, although Suyin was certain that word of Flora's arrest had spread throughout the Ship. She marveled at the self-righteousness of a man who would wait under such circumstances for her to call him, then wondered whether news of the bust had caused remark after all. She did not want to venture into the nets to see.

She sat curled in her chair wearing her oldest garment, a worn and faded robe hand-painted by a favorite aunt. Her pal was instructed to screen all calls save from Flora or Toshiro, but at 22:30 she asked if any had come in. None had.

"Is Flora Ming free to make calls?" she asked the Onboard.

"Only to her parents or to investigators of the Office of Civil Peace," the system said.

Suyin grimaced at thought of Flora's father, a communications technician who had not adjusted well to the sustained confinement of the *Centaur*, getting a late-night call from his troubled daughter. "Has she made any calls?" she asked, wondering whether the officials had suspended her supervision over her daughter's affairs.

"No," the system replied.

It would be interesting to ask the same question of Toshiro, but Suyin could not invade another adult's privacy without Julian's approval. In any event Toshiro doubtless had other avenues of communication for any intrigues he might entertain.

"His Flora Ming been mentioned on the chat nets during the last 12 hours?" she asked.

The question required sufficient processing power to answer that Suyin would be charged for it, but she didn't care. "No," the Onboard said after a second.

"Has my name been mentioned?"

"Yes."

Suyin closed her eyes, took a breath, and waited until she felt composed. "Display the first sentence containing my name," she said.

A single line appeared on her wallscreen. *He certainly got Suyin Ming dead to rights.*

Shorn of context, the sentence was almost meaningless, but Suyin feared taking a bigger bite until she knew the poison's strength. She gazed at it for several seconds, then, said, "Give me the paragraph."

She had to read two paragraphs before the discussion's shape emerged. "He" was the author of *The Tallest Child*, but the text under discussion was something called "The Key to the Chill," evidently produced by another hand.

"Am I mentioned in 'The Key to the Chill'?" she asked.

Continued on page 84

*Life is but a dream, or so goes the
old song. But if that's correct,
then what about life on Mars?*

A COLD DRY Cradle

It seemed...that if he or some other lord did not endeavor to gain that knowledge, no mariners or merchants would ever dare to attempt it, for it is clear that none of them ever trouble themselves to sail to a place where there is not a sure and certain hope of profit.

— Prince Henry the Navigator, assessing the motivations for sea exploration, circa 1480.

Part 1

He turned with a cry of surprise, falling helplessly with a silky slowness she would never forget. Piotr had caught his boot and when he tried to free it he managed to trip as well. His second yelp

rang in Ann's suit com when he hit the ground and his ankle snapped. His right arm smacked down vainly as he tried to break the fall. The impact sent plumes of red dust arcing up into the thin atmosphere. She trotted to him in the long, gliding steps that covered ground best in the deep gravel and low gravity. The dust began its lazy descent as she bent over Piotr and said, "How bad?"

"Da...Felt it go. Foot..."

She unfastened the bottom of his insulated legging and ran her hands lightly over the ankle cuff of the thin pressure suit underneath. "Suit looks OK, no breaches. How's your air?"

The dimmed dust had settled on his faceplate and she couldn't see him, but knew he would be checking the readouts on the inside of the helmet. "Normal." His voice was thin and strained.

"Good. How do you feel?"

He shifted slightly, groaned. "Like yesterday's blini. Light-headed. My right foot hurts like hell."

Keep him talking. Can't risk shock.

She kept her tone light. "That's what you get for doing cartwheels."

BY GREGORY BENFORD & ELISABETH MALARTREZ

"Uh. I can't move it."

She frowned, wondering how difficult it was going to be to get him back into the rover. Help was more than 35 clicks away, and she was driving the only vehicle on the planet. So the two of them had to manage it on their own. From the rover she could contact the other two members of the team, for moral support if nothing else. If she could get him there.

"Let's get you up."

"Awright." His slightly slurred voice worried her. They were all worn down after months in this cold, raw landscape and shock could be setting in.

She bent over and slipped her left arm clumsily around his waist, feeling like a kid in a snowsuit. Suit-to-suit contact had a curiously remote feel about it, with no feedback from the skin. Still, she liked hugging him, even this way. They slept together in a close embrace, ever since the launch from Earth orbit a year ago.

"I've got some great stuff in the rover that'll make you feel like a new man."

"Good. Aieee."

He heaved himself up onto his left leg, leaning heavily on her. Together they struggled for balance, threatened to go over, then steadied. She had long ago stopped counting how many times the 0.38 gees of Mars had helped them through crucial moments. It had proved the only helpful aspect of the planet.

"Whew. Made it, lover." Keep the patter going, don't alarm him. "Ready? I'll walk, you hop as best you can."

Like a drunken three-legged sack-race team, they managed to stagger slowly up the crater slope. "You will work as a team," the instructor at mission training had said, but she hadn't anticipated this. Over com came deep, ragged gasps. Hopping through gravel, even in the low gravity, was exhausting Piotr. Luckily the rover was just on the rim, about a dozen meters away.

Not at all like the electric dune buggies used in the Apollo Lunar missions, the Mars rover resembled an oversized tank on wheels. It was really a mobile cabin that could keep a crew of two out in the field for two weeks. She got him into the lock and set the cycle sequence. No time to brush off the dust; the cab inside was hopelessly thick with the stuff anyway. She heard the cycle finish and felt the rover's carriage shift. Good; he had rolled out of the lock and was lying on the floor. She hit the pump switch and oxygen whistled into the cabin from half a dozen recessed ports.

The chime sounded; they were pressurized. She turned off her suit oxygen, released the clamps on her helmet and as quickly as possible shrugged her parka, leggings, and finally, her suit. She shivered as she stepped out into the chilly cabin. She had actually been sweating on Mars — a novel experience. A prickly itch washed over her face and neck and already she regretted their dusty entry. The usual routine was to brush the suits down outside with a soft brush. Some genius from mission prep with a lot of camping experience had thoughtfully stowed it aboard, and it quickly had become one of their prized possessions. The Martian surface was thick with fine, rusty dust heavily laden with irritating peroxides. Her skin felt like it was being gently sandpapered during the long months here, especially when she was tired, as now.

Fluffing her short black hair, she doffed a red Boeing cap and went over to help Piotr. She upped the pressure to get him more oxygen and together they gingerly peeled off his insulating layers and his suit. A look at his leg confirmed her guess: broken ankle, swelling fast.

From there it was straight safety manual stuff: bind, medicate, worry.

"I love you, even zonked on painkillers," she murmured to his sleeping face when she had checked everything five times. He had dropped off disturbingly fast. He kept up a front of invincibility; they all did somewhat or they wouldn't be here; it went with the psychology. But he had the bone-deep fatigue that came from a hard mission relentlessly pursued.

She was suddenly very tired. Emotional reaction, she diagnosed wryly. Still, better tend to it.

Time for a cup of tea. She looked around first for her tea cozy,

carefully brought from Earth as part of her personal mass allowance. Nothing could've induced her to leave it behind — home was where the cozy was. She retrieved it from a corner of the cooking area. Originally light blue and cream colored, it was now stained irretrievably with the red dust of Mars. When things got tough she sought the comfort of a proper cup of tea made in a teapot. There were precious few emergencies that couldn't wait until after a cuppa.

As the water heated she got on the AM channel and tried to reach the other two back at the hub, got no answer. They were probably deep in the guts of the Return Vehicle, starting the final checks for the approaching test fire. She left a heads-up on the ship's message system that they were coming back. No way could she get any more done out here on her own. Anyway, Piotr came first, and any solo work was forbidden by their safety protocols.

She stared out of the forward view port at the pale pink hills, trying to assess what this accident meant to the mission. Maybe just a mishap, no more? But Piotr still had plenty to do, preparing for their return launch. No, this would screw up the schedule for sure. Her own work would get shoved aside. Face it, she thought — biology was not the imperative here any more. She had made her big discovery. To the world, their expedition was already a big success — they'd found life.

The robot searchers of years before had fruitlessly tried to find evidence of life or even fossils. But in the iron peroxide desolation all traces were erased. The tiny robots had an impossible task, akin to dropping a toy rover into Montana and expecting it to find evidence of the dinosaurs that had once tramped through its hills. Mars was bone-dry, but without bones. Not even the algal mats some had hoped might be preserved from the ancient lake beds.

The noxious peroxides had a good side, though. In chem labs Earthside, hydrogen peroxide was a standard disinfectant, giving the Consortium a handy argument against those who said a human expedition would contaminate the whole planet, compromising the search for life. In closed-environment tests, the peroxides scavenged up the smallest microbes, making it quite clear why the Viking landers had found no signs of organic chemistry. For Earth life, Mars was like living in a chemical blowtorch.

But Mars life had found a way to circumvent and vanquish the peroxides. Life here was widespread, subsurface microbes using the ubiquitous iron peroxides as their energy source. Within a week after landing, some of Mars's first exploratory cores had come up with streaks of a dark, crumbly soil-like layer less than a meter below the surface.

Hoping to find something interesting, she set up a plastic inflatable greenhouse dome outside the habitat, spiked samples of the Martian soil with water and nutrients, sealed them in small pressure vessels and incubated them. She could then check for any gases produced by the metabolism of life forms in the soil. She was essentially repeating the robot Viking biology program, but this time life was looking for life directly. To avoid the embarrassing possibility of introducing her own microflora into the experiment, she worked with the samples only outside, under the cold red-stained sky. In her pressure suit and insulating outerwear she was somewhat clumsy, and each step went slowly. But finally she was satisfied with the setup. The elevated greenhouse temperatures kept the water from freezing and speeded up the results enormously.

Sure enough, as in the Viking experiments, there was an immediate response of dry surface peroxides to the water. A spike of oxygen. When that had run its course she bled off the gases and resealed the pressure vessels. And was rewarded in a few days with unmistakable signs of renewed gas production. Carbon dioxide this time. The microscope then confirmed living colonies of Martian microbes. The rest, as they say, is history. So why was she still restless, unsatisfied?

The crackle of the radio startled her. "Home team here. Got your heads-up, Ann. How is he?" Marc Bryant's crisp efficiency came over clearly, but she could hear the clipped tension anxiety, too.

"Stable." She quickly elaborated on Piotr's symptoms, glancing at his sleeping face. They had each taken a month of medical training but Marc had more. She felt relieved when he approved of her treatment. "Got to think what this means," he said laconically. "We'll be there for supper. Extra rations, I'd say."

A small, very small joke. They had celebrated each major find with a slightly excessive food allotment.

So far, they had not marked disasters this way. And they were having their share.

The first was the vent failure on the flight out. They found they had lost a big fraction of their water reserve, four months out from Earth, from a blown valve. There had been no time to console themselves with food, and good reason not to. They had landed bone-dry, and lived on the water manufactured by the Return Vehicle's chem plant ever since. That accident had set the tone for the others. Celebrate the triumphs, overcome the disasters.

"My night to cook, too," Marc said, transparently trying to put a jovial lit to it. "Take care, gal. Watch the road."

Here came the heart-squeezing moment. She turned the start-up switch and in the silver of time before the methane-oxygen burn started in the rover engine, all the possible terrors arose. If it failed, could she fix it? Raoul and Marc could come out in an unpressured rover and rescue them, sure, but that would chew up time ... and be embarrassing. She wasn't much of a mechanic, but still, who likes to look helpless?

Then the mixture caught and the rover chugged into action. Settling in, she peered out at the endless obstacles with the unrelenting concentration that had gotten her on this mission in the first place. To spend 550 days on Mars you wanted people who found sticking to the tracks a challenge, not boring. She followed the auto-tracker map meticulously, down a narrow valley and across a flood plain, then over a bolder-strewn pass and down a narrow valley and across a flood plain, then over a pass

Here, a drive back to base that proved uneventful was even pleasant. Mars was always ready to thunk a wheel into an unseen hole or pitch the rover down a slope of shifting gravel, so she kept exactly to the tracks they had made on the way out, no matter how enticing a distant flow pattern in the rocky shelves might be. She had seen enough of this red-hued terrain to last a lifetime, anyway. Nothing more out there for a biologist to do.

In the distance she caught sight of the formation she and Piotr had dubbed the Shiprock on the way out. It looked like a huge old sailing ship, red layers sculpted by eons of wind. They'd talked about Ray Bradbury's sand ships, tried to imagine skimming over the undulating landscape. The motion of the rover always reminded her a little of being on the ocean. They were sailing over the Martian landscape on a voyage of discovery, a modern-day Columbus Journey. But Columbus made three voyages to the new world without landing on the continent. He "discovered" America by finding islands in the Caribbean, nibbling on the edges of a continent. A sudden thought struck her: was that what they were doing — finding only the fringes of the Mars biology? Many people had speculated that the subterranean vents were the most likely places for life on this planet. The frontier for her lay hundreds of meters below, out of reach. She sighed resignedly. But it had been great fun, at first.

She slurped more tea, recalling the excitement of the first months. Some of it was pure fume-rush, of course. Men on Mars (Uh, and a woman, too.) They were household names now, the first Mars team, sure bets for all the history books. Hell, they might eventually eclipse Neil Armstrong.

She was first author on a truly historic paper, the first submitted to *Nature* from another world. Barth, Bryant, Molina & Trevinski's "Subsurface Microbial Life on Mars" described their preliminary findings: it would rank with Watson & Crick's 1953 paper nailing the structure of DNA. That paper had opened up cell biology and led to the Biological Century.

What would their discovery lead to? There was already a fierce bidding war for her samples. Every major lab wanted to be the first to crack the Martian DNA code, and determine the relationship between Martian and terran life. Her simple chemical tests, staining samples of thin-sectioned Mars colonies under the microscope, had shown that the basic constituents of life — proteins, lipids, carbohydrates, nucleic acids — were the same here, or at least close enough to respond to the same chemical tests.

She used standard techniques and extracted what seemed to be DNA from the microbes. So how similar was it to Earth-style DNA? She ran some hybridization tests with the dried DNA of terran microbes she'd brought along. Basically, you unzip the double-stranded DNA helix by heating, then mix the soup of single strands with strands of a different DNA. When the mixture is cooled down again, strands that are similar enough pair up. She got just enough pairing between Martian and terran microbial DNA to conclude that life on both planets at least used the same four-letter alphabet.

That was exciting, but not conclusive. In other words, all DNA might have to be composed of the same four bases just for molecular structural reasons.

But the DNA code was something else. DNA spells out the amino acids, which then construct the cellular proteins — both the structural brickwork and the busy enzymes that do the cell's business. If Martian DNA spelled in the same language as on Earth, it would mean unequivocally a common origin for life.

When she tried sequencing the Martian DNA, it came out gibberish. It looked like Earth-style DNA, but she couldn't match it to known gene sequences. It was, once again, an ambiguous result. And that was as far as she could go with her equipment. The rest would have to wait.

Assuming that life emerged only once for the two planets, where did it start? If Mars cooled first, life would arise here while Earth was still a pool of hot lava. And come to Earth via the meteorite express. The Martian meteorites with their enigmatic fossils had tantalized scientists for years. When they were first discovered, the big question had been whether they actually contained fossils, because most people thought they knew that Mars was lifeless. Now we know about that part, at least, she thought.

Organized life forms from Mars seeding Earth's primitive soup of basic organic molecules would quickly dominate. Martians come to harvest Earthly resources. H.G. Wells with a twist. We may yet be Martians. Pretty heady stuff for the scientific community, and it would change our essential world view. Full employment for philosophers, too, and even religious theorists.

But deep down she realized she'd wanted to find L¹⁴C¹⁴E, not microbes. The ghosts of Carl Sagan's grafies had shaped her expectations. Marc was jazzed by the discovery of deeper layers of microbes, separated by layers of sterile peroxide-laden sediments in the old ocean beds. That implied periodic episodes of a wet and warm climate. But so far she had not found anything other than the soil microbes. Even the volcanic vent they had explored had no life, only peroxide soil blown into it from the surface, like a dusty old mine shaft. And now they were about to leave and the subterranean caverns were still unexplored. Damn!

After five hours Piotr was doing well, and had regained his energy and good spirits. They even managed a clumsy but satisfying slap and tickle when she stopped the rover for lunch. They weren't going to get any more privacy, not with just two weeks to go until the return launch. She felt nervous and skittish but Piotr was a persistent sort and she finally realized that this just might do both of them more good than anything in the medicine chest back in the habitat.

The route began to take them — or rather, her, since Piotr crashed again right after sex; this time she forgave him — through familiar territory. She had scoured the landscape within a few days of the hab. Coming down in the Cheyse basin, they got a full helping of Mars: chasms, flood runoff plains, wrinkled canyons, chaotic terrain once undermined by mud flows, dried beds of ancient rivers and lakes, even some mysterious big potholes that must be mini-volcanoes somehow hollowed out. Her pursuit of surface fossil evidence of life had been systematic, remorseless — and mostly a waste.

Not a big surprise, really, in retrospect. Any hiker in the American West was tramping over lands where once tyrannosaurs and bison had wandered, but seldom did anybody notice a bone sticking out of the ground. Ann was more systematic and probed deeper in the obvious places, where water had once silted up and could have trapped recently dead organisms. Algal mats, perhaps, as with the first big life forms on Earth. But she had no real luck, even in a year and a half of snooping into myriad canyons and promising beds of truly ancient lakes. That didn't mean life wasn't somewhere on the planet. A billion years was a long time, enough for life to evolve, even if Mars had not supported surface life for perhaps three billion or more.

She stamped her feet to help the circulation. Space heaters in the rover ran off the methane-oxy burn, but as always, the floor was cold. When the outside was tens of degrees Centigrade below zero, gradients in the rover were steep. Mars never let you forget where you were.

She tried to envision how it must have been here, billions of years ago. Did life give way with a grudging struggle, trying every possible avenue before retreating into the diminished role of mere microbes?

The planet did not die for want of heat or air, but of mass. With greater gravity it could have held onto the gases its volcanoes vented, prevented its water vapor from escaping into vacuum. Spilt from hydrogen by the sun's stinging ultraviolet, the energetic oxygen promptly mated with the waiting iron in the rocks. The shallow gravitational well failed. Light hydrogen blew away into the yawning vastness of empty space. Had Mars been nearer the Sun, the sunlight and warmth would simply have driven water away faster.

So those early life forms must have fought a slow, agonizing retreat. There were eras when lakes and even shallow, muddy seas had hosted simple life — Marc's cores had uncovered plenty of ancient silted plains, now compressed into sedimentary rock. But no fossil forests, nothing with a backbone, nothing with shells or hard body parts. If higher forms had basked in the ancient warmth here, they had left no trace.

The squat hab came into view in the salmon sunset. Looking like a giant's drum, five meters high and eight meters across, it stood off the ground on sturdy metal struts. Long pink and white streamers of carbon dioxide and water vapor trailed from roof vents, signaling that Marc and Raoul were there. Inside, the two stacked decks had the floor space of a smallish condo, their home for the last two years. Not luxurious, but they would certainly be nostalgic for it in the cramped quarters of the Return Vehicle they would shortly be boarding.

By now the hab was familiar to billions of Earthbound TV viewers and Net surfers. Everyone on Earth had the opportunity to follow their adventures, which were beamed daily from Ground Control and carried on the evening news. Their Web page registered over a hundred million hits in the week following the landing. Mars had ceased to be Space and had become a place.

She told herself that she had done all anybody reasonably could. After finding the microbes, she had postulated that they used an enzyme like catalase to harvest the peroxides' energy. Then she had tested it in her small greenhouse set-up, found it worked. She would write that up on the half-year voyage home, squirt it e-mail to an eager

audience of every biologist in the world. Heady stuff!

She had data on chemical and biological toxicity of Martian substances to terrestrial biota. Another paper there, too. Plus work on the suitability of local soils to support greenhouse agriculture. Marc had even tried to grow kitchen herbs, but none of the seeds sprouted. Her long searches for fossil microbial mats in the paleosols had turned up plenty of oddities that might bear fruit under rigorous inspection back Earthside. But she still felt she was just nibbling at the edges, but of what?

Raoul and Marc climbed down out of the hab as she approached in the last slanting rays of a ruddy sunset, two chubby figures in dark parka suits. Only Raoul's slight limp distinguished them. The tracker system had alerted them, and they would have to carry Piotr in. Plus a little ceremony they had devised: salvaging water from the rover. The methane-oxygen burn made carbon dioxide, which the engine vented, and pure water. She backed the rover to the conical Return Vehicle, with its gaudy red-on-white Mars Consortium wrap-around letters, a meter high. Raoul and Marc hooked the water condensers to the input lines, so the chem factory inside could store it. They had full tanks of methane and oxygen for the liftoff, but water was always welcome, after the parching they had taken on the long flight here. The guys did this last task by way of saying "welcome home". In the bleak, rusty dusk, the cold of night biting already through her ski-suit, the symbolism was important. Mars was sharp, cold and unrelenting, and they all felt it to the bone.

Part 2

Despite Marc's best efforts, dinner was not a culinary success.

Marc was the foodie among them, forever trying out new

combinations of the limited range of kitchen stores. But they had long ago exhausted the narrow potential of the kitchen stores for new tastes, and now everything they ate was too familiar to the tongue, though Marc kept trying. He had even brought along spices as part of his personal mass allowance. Some of his infamous attempts had produced stomach-rumbling distress. The microwaved frozen vegetables especially resisted creativity. Still, the food was much better than the freeze-dried horrors of NASA days ... or so some said.

They took turns in the tiny galley. On the outbound voyage Ann bowed to the public's expectation and dutifully did her time, but the others agreed that the results were definitely substandard, and she was relieved of cooking. Instead, she did extra cleanup. That didn't bother her, a dedicated non-foodie, who believed that eating was a somewhat irksome necessity. She went through school with a minimally equipped kitchen. Throwing a box of macaroni and cheese into boiling water stretched her limits. Piotr joked that he sure as Hell hadn't married her for her cooking. She actually liked good food, but wasn't interested in taking the time to produce it.

"So what did you two do while we were gone?" Ann asked later over very slightly grainy pudding. The chocolate color disguised any visible traces of Martian dust, but the tongue found its sting.

Marc licked his spoon carefully. "Well, we drilled another core. Found something ... interesting."

"Where were you working?" asked Piotr.

"We took the runabouts back to the mouth of the big canyon in Long Ridge — you know, where we saw the fog a couple of months back on that early morning trip." The base sported two open dune buggies that the crew used for short sprints of less than 10 clicks round-trip. By taking both buggies, it was possible to haul the drilling gear.

Ann shivered, remembering the biting cold that morning she and Marc had seen the fog, suit heaters cranked to the max, looking like quilted penguins. Their picture now graced the cover of the *Lands' End* catalogue, wearing the parkas and leggings now called *Marsweat*, of course. It was the latest rage in macho-type clothes, and the underwriting helped pay for the mission.

As they'd prepared to leave the rover she'd grabbed her tea cosy and worn it like a knit ski cap. That was only the first time she'd used it as extra insulation.

Marc continued, "We were down about thirty meters, going pretty slow through some resistant stuff, then all of a sudden the drill started to cut down real fast. I stopped it then so we wouldn't lose the tip. But when we pulled out the drill stem and core, it was smoking."

"Uh-oh," said Ann, automatically sympathetic.

"That's what it looked like, anyway, but it wasn't hot, wasn't even warm." He smiled, looking at Ann and Piotr slyly.

"So how could it be smoking — oh, wait, it was water vapor!" shouted Ann. "You found water?"

Marc grinned. "Yep. The drill tip was really wet, and making cloud like mad." It was so cold and dry on Mars that water on the surface never passed through a liquid stage, but sublimed directly from frozen to vapor. The team had concentrated their efforts to drill for water in places where early morning fogs hinted at subsurface moisture.

"So, the deepest core is always the wettest. Makes sense. There really must be frozen oceans down there," said Ann.

"What does Earth think?" asked Piotr.

"Well, with all the data from the other cores, first indications are that it's probably good enough."

"Good enough for the government, as they say," said Raoul with uncharacteristic levity. Raoul Molina, the compact and muscular fourth crew member, was the top mechanic on the team, and ritually cynical about governments. He even disliked the fact that NASA had separately contracted with the Consortium to supply some geological data.

"Too bad we're not working for the government, eh?" shot back Marc.

Ann looked over at him, surprised. The brief exchange left much unsaid, but all understood the shorthand. Tensions were definitely building as the launch date approached. No one wanted to be the cause of a delayed return. The search for subsurface water had gone slowly, disappointing some of the mission backers, and raising the specter that the team would be asked to stay longer to complete the mapping.

After dinner it was time for their regular video transmission to Earth. They pulled Consortium logo shirts over their waffle wear longjohns and prepared to look presentable. In fact, they wore as little as possible when in the hab — loose clothing didn't aggravate the skin abrasions and frostbite spots they suffered in the suits. They kept the heat cranked up to compensate, but then nobody had to pay the electric bill, Marc pointed out. Competition was keen for creams and ointments for their dry skin rashes.

"My turn, I think," said Marc.

Ann smiled. "Janet on the other end tonight, then?" Janet Barton was a former test pilot who had trained with them, and clearly had hoped to make the trip. The Consortium had made a careful selection: individual talents balanced with strategic redundancy. The crew of four had to cover all the basics: mission technical, scientific and medical. They fit it together like an intricately cut jigsaw puzzle.

In the end it had come down to a choice between Janet and Piotr, and Ann was relieved at the final decision. She didn't know if she could have left Piotr behind so soon after their marriage, even for a trip to Mars.

For the thousandth time she wondered if that had figured in the crew choice. Adding a woman had inevitably made for tensions, but on the other hand, it also gave half the possible Earth audience somebody to identify with. And the Consortium could be subtle.

"Let's play up the water angle, not the ankle," Piotr said.

"Drama plays better than science," Ann said.

"So we must educate, yes?" Piotr jabbed his chin at Marc.

But Marc wasn't listening. The brief description of Piotr's accident had been squirted to Earth earlier, and he was downloading the reply. Due to the time delay of six minutes each way, normal back and forth conversations were not possible, and communications were more like an exchange of verbal letters. At times the round-trip delay was only a matter of seconds, sometimes it was 40 minutes. Nonetheless,

Earth and Mars teams agreed on a download at a specified time to preserve the semblance of a conversation. They did a short video sequence at the same time. It was great theater, but the Consortium also had a team of doctors scrutinize the footage.

At the short delay times Marc and Janet tended to handle the bulk of the communications. And there was a little spark in the transmissions.

The crew gathered around the screen to watch the latest video from Earth. It was Janet, all right, gesturing with a red Mars Bar. Waiting for a successful landing, Mars, Inc., the candy manufacturer, had agreed to become a mission underwriter, releasing a special commemorative wrapper — a red number featuring the four of them against a Martian backdrop. They had taken about twenty shots of each crew member holding up a standard Mars Bar before a scenic backdrop. They each got \$5,000 per shot, with the Mars Bar people paying \$10,000 per pound to ship a box of the bars out for the photo shoot. It would have been irritating after a while, except that they came to relish the damned things, keeping one for exterior shots, where it quickly got peroxide-contaminated, and eating the rest as desserts. The cold sopped up calories and the zest of sugar was like a drug to Ann. She was quite sure she would never eat another, back home, even if she did get an endorsement contract out of the deal.

Ann had dubbed the resulting red-wrapped candy the Ego Bar, unwilling to honor it with the name of a planet and an ancient god, and the team adopted the name. There had been some talk early on about producing another wrapper with Mars life pictured, but microbes weren't exciting enough, and the manufacturer had just decided to stick with the Ego Bar.

Somehow, the commercialism of it all still grated on her. But she had signed on with eyes open, all the same. She had known that market-minded execs ran the Consortium, but going in had thought that meant something like, If we do this, people will like it. Soon enough she learned that even exploring Mars was seen by the execs as if we do this, we'll maximize our global audience share and/or optimize near-term profitability. Such were the thoughts and motivations on Earth. Still, Mars the raw and unknown survived, unsullied and deadly.

The spirit of getting to Mars on private capital was to shuck away all excess. No diversionary Moon base. No big space station to assemble a dreadnought fleet. No fleet at all — just missions launched from Earth, then propelled outward by the upper stage of the same booster rocket that launched them. They had then landed on Mars after a long gliding journey, as the Apollo shots had.

But the true trick was getting to Mars without squandering anybody's entire Gross National Product. When President Bush called in 1989 for a manned mission to Mars on the 50th anniversary of the 1969 Apollo landing, he got the estimated bill from NASA: 450 billion dollars.

The sticker shock killed Bush's initiatives in Congress. The price was high because everyone in NASA and their parasite companies tacked every conceivable extra onto the mission.

When evidence of ancient fossil microbes had turned up in 1996 and later, public interest returned. Soon enough, even Congress-creatures realized that the key to Mars was living off the land. Don't lug giant canisters of rocket fuel to Mars, just to burn it bringing the crew back to Earth. No fluids like water hauled along for an 18-month mission. Instead, get the basic chemicals from the Martian atmosphere.

The Mars Consortium had begun by sending an unmanned lander, the Earth Return Vehicle. It carried a small nuclear reactor for power, an automated chemical processor, the rovers, and the Return Vehicle, unfueled. Using the nuclear reactor power, it started its compressors. They sucked in the thin Martian carbon dioxide and combined it with a store of hydrogen hauled from Earth. This made methane and water. The chemical plant was compact, laboring for half a year to separate the methane into the rocket fuel tanks and clean some of the water for later human use. The rest of the water got broken into oxygen and hydrogen, and the oxygen was reserved

for later combination with the methane in the combustion chambers of the Return Vehicle.

All this was simple chemistry: hauling to Mars only hydrogen as a feed stock for the process, the ship made 18 times as much rocket fuel as the mass of hydrogen it brought. Taking all that fuel to Mars would have cost billions, plus assembly of the mission in orbit. By going slim and smart, the Consortium saved all that. Had the early European explorers tried to carry all their food, water, and fodder to the New World, few could have gone.

Slightly over a year after the first launch, the refueled Return Vehicle awaited the crew. They had launched on a big Saturn-style booster rocket, the contribution of the Russian partner, Energiya. Their closed-loop life-support system had recycled the air and water.

As their upper stage burned out, it pulled away on a tether cable about 300 meters long. A small rocket fired on the habitation drum, setting it to revolving with the upper stage as its counter-weight. At two revolutions a minute, the hab drum had a centrifugal gravity of 0.38 Earth's, to get them used to Mars.

At the end of six months gliding along a curving trajectory close to the minimum-energy orbit, the hab cut the cable. Rather than firing its rocket right away, it used an aeroshell — a cone-shaped buffer — to brake itself as it swung around the planet. They targeted on the radio beacon set up for them and landed right beside the fueled Return Vehicle.

All this was risky; their loss of precious water on the way out had come close to doing them in. Making exploration supersafe was not only hugely expensive, it was impossible. Further, it was anti-dramatic: The public audience was thrilled all the more if lives truly were at stake.

Risks were both obvious — a blowup at launch, as with the Challenger shuttle — and subtle, as with radiation dosage. The voyage exposed them to the solar particle wind and to cosmic rays. They could shelter from solar storms, which were infrequent, but the rest of their exposure amounted to about a 5 percent increased probability of having a fatal cancer within their life span.

Further, Mars itself could do them in. Storms could collapse their habitat or blow over their return rocket. Dust could clog the pumps at the crucial blast-off.

But the 1970s Viking landers had been designed to last 90 days, yet one held out for four years against cold, wind and dust, and the other lasted six.

Multiple backup systems are the key to safety — but the more backups, the higher the cost. Bush's 450 billion dollar program showed that a NASA-run program could easily turn into an enormous government pork farm.

So a radical idea arose: The advanced nations could get this adventure on the cheap by simply offering a prize of 30 billion dollars to the first successfully returned, manned expedition.

This mechanism European governments had used for risky explorations centuries ago. The advantages are that the government puts out not a dime until the job is done, and only rewards success; investors lose if their schemes fail. Also, if astronauts died, it was on somebody else's head, not an embarrassment to a whole government.

So the Mars Consortium of Boeing, Microsoft, Lockheed and the Russian Energiya took the plunge. They originally wanted to use the name Mars, Inc., but discovered that a candy manufacturer had long ago beaten them to it. A Japanese partner bowed out, finally contributing only the smart-toilet, now dubbed the Marsbidet. At \$10,000 to fly a pound to Mars, disposables were impossible. This went right down to writing paper — erasable slates served better, and could be digitally saved, even sent Earthside — and toilet items. Nobody had figured out how to recycle toothpaste, but toilet paper was dispensable. The smart toilet combined a bidet arrangement of water jets with a small blow-dryer. Since its inclusion on the mission it was the hottest piece of plumbing on two planets.

A second mission attempt was being made by Airbus Interspace, formed from the French Nationale Industrielle Aérospatiale, British Aerospace, the Spanish Construcciones Aeronauticas S.A. and Daim-

ler-Benz Aerospace. The Airbus group had a more cautious method; their fully fueled Return Booster had arrived in Mars orbit four months before. The Airbus crew had launched 50 days later. They could win only if the Consortium's Return Vehicle failed at launch. The whole world was watching the race ... which made the Consortium's nightly "Hello, Earth" show rake in the dollars.

They all snorted when the usual question came in from Janet. She looked embarrassed, but what could she do? "And how are you feeling, with Airbus getting nearer and your own launch —"

Marc started before Janet finished. "We'll wave to them as we head home."

Everybody laughed, but there was a forced quality to it.

After the usual updating on Ann's folly, Janet wished Piotr a speedy recovery, transmitted some bland medical advice, and then turned to quasi-technical details about the upcoming liftoff test. Piotr's accident was one more mishap to be overcome. Janet didn't fail to mention the obvious: The broken ankle meant their captain would be less effective if anything went wrong with the liftoff of the Return Vehicle. What should have been a routine test in this part of the mission was looming as a potential crisis.

On arrival they had discovered that it was damaged. A failure in the aerobraking maneuver made the Return Vehicle come in a shade too fast, crushing fuel pipes and valves around the thruster. None of the diagnostics had detected this, since the lines were not pressured. In some instances the damage went beyond mere repair and Raoul had been forced to refashion and build from scratch several of the more delicate parts. Working with Earthside engineers, he had been steadily making repairs.

In this he drew upon not only his technical training, but his family's tradition of Mexican make-do. His father and uncle ran a prosperous garage in Tecate, just below the U.S. border. He'd grown up in greasy T-shirts with a wrench in his hand. Coming from a country with a chronic shortage of hard goods meant that "recycle and reuse" was not just a slogan but a necessity. Raoul was good at creative reuse, making novel pieces fit, but never before had he worked under this kind of pressure. Their return, and quite possibly their lives, depended on his repairs.

They ended the transmission on an edgy note. It was 13 days and counting to launch.

There was plenty of grunt labor to get ready for the liftoff test. Gear they had used on the repairs, supplies dumped months ago while in a hurry, scrap parts — all had to be hauled away from the Return Vehicle. The big job was taking out parts of the chem factory that they wouldn't need on the long glide back to Earth. Every kilogram extra they carried made their fuel margin that much slimmer, and it wasn't that far to begin with.

Ann didn't mind the heavy labor. The low gravity helped but the laws of inertia still governed. Man-handling gear into the unpressured rovers to stow it for the next expedition at least gave her a chance to think; simple jobs didn't absorb all her concentration. That was when all her frustrations surfaced and she decided to do some pushing of her own.

After the usual heavy-carbo lunch she found Marc in the hab's geology lab, packing a core for transport.

"What do we do now?" she asked. "Just you and me?"

Their last, long expedition in the rover was out — that much was clear. Safety protocols demanded two in the rover, and both mechanics, Raoul and Piotr, had to be working on the Return Vehicle. Marc was the backup pilot, so he would be needed to help Piotr, at least through the liftoff trial.

"You're going to tell me, right?" He grinned.

"I'm not going to sit around twiddling my thumbs on my last two weeks on Mars."

Marc said crisply, "You can't go out for a week by yourself, Ann."

"I know. Come with me, Marc. There's just enough time left for a vent trip."

The extensive Return Vehicle repairs had cut into all their schedules. For the week-long rover trips, mission protocol decreed that one of the pair be a mechanic—Raoul or Piotr. When the two of them were tied up with Return Vehicle repairs, Ann and Marc were restricted to day trips in the rover. Marc had filled his time setting off lots of small seismic blasts, and was surprised to discover extensive subterranean caverns several hundreds of meters down. So far they hadn't found a way in to any of them, and Ann knew Marc was itching to get down there.

Marc looked doubtful. "You did that already. I thought we agreed it was a bust. No life or fossils."

"Yes, but we picked a vent that was outgassing remnants of atmosphere—it had oxygen in the mix."

"So? We were looking in the most likely place for life."

"For Earth life, and ancient Mars life, but not modern Mars life. Oxygen is most likely poisonous to the organisms we're looking for."

Marc frowned, distracted by his chore. "Why so?"

"About four billion years ago, Earth's atmosphere was a byproduct of the early photosynthetic microbes... precursors of plants. They succeeded by learning how to make their own food, and by poisoning the competition, the anaerobes, with their wastes."

"Oxygen?"

"Right!" Ann nodded vigorously, caught up in her vision. "On Earth, anaerobes went underground or underwater to get away from the poisonous oxygen atmosphere. Here on Mars, oxygen-using forms would have been eliminated when the planet lost its atmosphere. Maybe it's their descendants under the soil, living off the peroxides. But the anaerobes only had to fight the cold and drought. They must have followed the heat and gone underground."

"Where'd you want to look?"

"The big vent about 55 clicks to the north is the closest."

Marc said, "We could maybe manage a few days in the rover, no more."

"Good enough. I'll start packing."

"Not so fast. We've all got to agree."

Raul shook his shaggy head. All the men were letting their hair grow out to the max, then would shear it down to stubble just before liftoff, including beards. The "Mars Bald" look, as Earthside media put it, went for Ann, too. In the cramped hab of the return vehicle, shoddy hair was just another irritant. If it got into their gear, especially the electronics, it could be dangerous. He gestured at the injured Piotr. "Without him, we'll take longer to complete checkout. Marc, I know it's not your job, but I'll need both you and Ann to help. I want to eyeball every valve and servo in the undercarriage."

"Okay, I can see why you need all of us for that. But once it's done—"

"Until we've done the liftoff, planning is pointless," Piotr said in a voice that reminded them all that he was, broken aside or not, the commander. So far he had not needed to throw such weight around. Ann shot him a look and saw in his face the man who was the commander/mechanic first and her husband second. Which was as it should be at this moment, she knew, even if a part of her did not like such facts right now. She said slowly, "I have a quick run we could do."

Piotr called from his bunk. "For jewels, I hope."

She grimaced. Piotr was deeply marked by the bad years in Russian space science following the collapse of the Communist economy. She recalled his saying, "In those dark years, the lucky ones were driving taxicabs, and building spaceships on the side. The others just starved." Not only research suffered. Some years there had been no money period. Faced with no salaries, staff members in some science institutes found new ways to raise money, sometimes by selling off scientific gear, or museum collections. It was like her grandparents, who had grown up during the Great Depression; they couldn't get money far from mind. So Piotr made a fetish of following Consortium orders about possible valuable items: he scrounged every out-

cropping for "nuggets," "Mars jade," and anything halfway presentable. They all got a quarter of the profits, so nobody griped. Still, Piotr's weight allowance on the flight back was nearly all rocks—some, she thought, quite ugly.

"No, for science."

Piotr gave her a satirical scowl.

"Your vent idea," Raoul eyed her skeptically.

"There are three thermal vents within a hundred kilometers. I want to try the closest one, to the north."

"We've studied their outgassing, the whole area around them," Marc said. The Consortium wanted information on water and oxygen; they could use it on later expeditions, or sell the maps to anyone coming afterward.

Raoul shook his head, scowling. "We've already got one injury. And we've looked in one vent already. Crawling down more holes isn't in the mission profile."

"True, but irrelevant," she said evenly. Raoul was the tough one, she saw. Piotr would support her automatically, though grumpily, if she could fit her plan into mission guidelines. Marc, as a geologist, had a bias toward anything that would give him more data and samples.

"It's too damned dangerous!" Raoul suddenly said.

"True," Marc said. "We could use our seismic sensors to feel if there are signs of a venting about to occur, though, and—"

"Nonsense," Raoul waved away this point. "Have you ever measured a venting?"

"Well, no, but it cannot differ greatly from the usual signs on Earth—"

"We do not know enough to say that."

She had to admit that Raoul was right in principle; Mars had plenty of nasty tricks. It certainly had shown them enough already from the pesky peroxides getting in everywhere—even her underwear!—to the alarming way seals on the chem factory kept getting eaten away by mysterious agents, probably a collaboration between the peroxide dust and the extreme temperature cycles of day and night. "But our remote sensing showed that venting events are pretty rare, a few times a year."

"Those were the big outgasings, no?"

"Well, yes. But even so, they are low density. It's not like a volcano on Earth."

"Low density, but hot. Our pressure suits do not provide good enough insulation. I believe we all agree on that."

This provoked rueful nods. The biggest day-to-day irritant was not the peroxides, but the sheer penetrating cold of Mars. Raoul's style was to hedgehog on the technicals, then leap to a grand conclusion. She got ahead of him by not responding to the insulation problem at all, but going to her real point. "The vents must be key to the biology."

"We have done enough on biology," Raoul said adamantly.

"Look—"

"No," he cut her off with a chop of his hand, the practical mechanic's hand with grime under the fingernails. "Enough."

And they all had to agree. In Raoul's set jaw she saw the end of her dreams.

The liftoff test came after two days of hard labor. They had been burning methane with oxygen in the rovers for more than five hundred days, but that was with carbon dioxide to keep the reaction heat down, acting like an inert buffer much as nitrogen did in the air of Earth. But the Return Vehicle boosters would burn at far higher temperature. The many engineering tests said the system would withstand that, but those were all done in comfortable labs on Earth. And they did not use a system that had ruptured on landing and that Raoul had labored month after month to repair.

A warning call from Raoul made her crouch down. They had decided that this test liftoff, just to see if anything blew a pipe, would have only Raoul and Piotr aboard. Piotr could run the subsystems fine from his couch. She and Marc took shelter a few hundred meters away, ready to help if something horrible happened. The stubby

Return Vehicle stood with its chem systems detached and gear dragged away, looking a bit naked against pink soil as thoroughly trod as Central Park in Manhattan, and with more litter.

She and Marc had nothing to do but pace to discharge all their adrenaline. The damned cold came through her boots as always and she stamped them to keep the circulation going. Even the best of insulation couldn't keep the cold from penetrating through the soles of the boots. It was early morning, so they would have a full day of sunlight to make repairs. She seldom came out this early into the biting hard cold left over from the night. Quickly enough they had learned the pains of even standing in shadow, much less of Martian night — skin stuck to boot tabs, frostbite straight through the insulation. Raoul's limp resulted from severely frostbitten toes after hours of making repairs in the shadow of the Return Vehicle.

She closed her eyes, trying to relax. They were about to land on Mars for the second and last time; think of it that way. Such odd ways of taking each moment, relieving it of its obvious heart-thudding qualities, had sustained her through the launch from Earth and their aerobreaking. Months of tedious mission protocols and psychological seminars had given her such oblique skills.

"Ready," she heard Raoul through the suit com. "Starting the pumps."

Piotr responded with pressure readings, flow rates. She saw a thin fog form beneath the rocket nozzle, like the vapors that sometimes leaked from the soil as the sun first struck it.

More cross-talk between the pilots. Their close camaraderie had been so intensive the past few days that she and Marc felt like invisible nonentities, mere "field science" witnesses to the unblinking concentration of the "mission techs," as the terminology went. Then Raoul said, almost in a whisper, "Let's lift."

A fog blossomed at the Return Vehicle base. No gantry here, nothing to restrain it. The conical ship teetered a bit, then rose.

"Nice throttling!" Marc called.

"Wheeee!" Ann cheered.

The ship rose 20 meters, hung — then started falling. A big plume rushed out the side of the ship. Crump! came to her through the thin atmosphere. A panel blew away, tumbling. The ship fell, caught itself, fell another few meters — and snacked down.

"All off!" Raoul called.

"Pressures down," Piotr answered, voice as mild as ever.

"My God, what —?"

Then she started running. Not that there was anything she could do, really.

At least the damage was clear. The panel had peeled off about a meter above the reaction chamber. Inside they could see a mass of popped valves.

"Damn, I built those to take three times the demand load," Raoul said.

"Something surged," Piotr said. "The readout shows that."

"Still, the system should have held," Raoul insisted, face dark.

"Over pressure was probably from that double line we made," Piotr said mildly.

"Umum," Raoul bit his lip; she could see his pale face through his helmet viewer and wondered if he felt defeated. Then he nodded briskly. "Probably right. We should check with the desk guys, but I'll bet you're right."

"The double line was their idea."

"Right, Piotr. We'll go back to the original design."

Somehow this buoyed them. It had to, she reflected. Either they get the system working or they wouldn't dare lift. The Airbus crew would rescue them, maybe, getting the glory and the 30 billion dollars.

"Should I contact Ground Control now, or wait until you get back to the hab?" Marc asked.

"They control nothing," Raoul said. "We're in control."

"Is damned right," Piotr said, laughing in a dry way.

"Okay." She grinned uncertainly and Marc followed suit.

"I suppose we should wait, talk to Earthside before we pull anything out and start refitting," Raoul said.

Piotr's voice cracked in the radio, his accent more noticeable. "Nyet, nyet, no waiting. You do it. And Marc, tell them, the Airbus — we may need their vessel to get home."

She brought up the unthinkable as a way of edging her way around to her own agenda. What the hell, they were all exhausted from laboring on the repairs, and it had been three days. They were nearly done. Time to think the unthinkable again.

Ann turned to Marc. "Okay, suppose we can't get off at all. We've got months until Airbus gets here. What do you think we could do with the highest impact?"

Marc looked surprised. Nobody answered for a very long time. She could see in their faces a vast reluctance to face this issue. But they had to. Finally Marc said slowly, "Geology, maybe."

Piotr laughed scornfully. "Scratch scientist, find fanatic. Geology we have plenty. A cold dry desert with red rocks and ancient water erosion. Not much better than the Viking pictures."

Raoul said reasonably, "Ann, this is an old argument. Of course the Viking landing spots were purposely picked to be flat and boring and dry. Not the best places to look for life, but the safest to land. Now we know Viking could never, anywhere on Mars, have found your microbes that retreated to their little layer when the seas and lakes dried up."

"Over a billion years ago, I estimate," Marc put in.

"We don't know that the microbe retreat model is the only one," she said.

Piotr called, "Ah, your new version of the old Sagan argument. While Viking was licking dust into the biology experiments, an undetected Martian granule walked by on the other side of the lander."

Ann bristled but did not show it. Sometimes she wondered if Piotr had to occasionally show that he was not just her husband, and thus an automatic ally. "I'm not really expecting Earth-type animals, but I'm keeping an open mind about other possibilities."

Marc blinked. "You really think we'll find more than microbial life in a vent?"

"I certainly think we should look. We're probably never going to be here again, any of us." She looked around at them. "Right?"

This they had never discussed. In some ways the surface mission was the least risky part of the expedition, the first four-fifths in days spent but not in danger. Their coming launch was risky, and the aerobreaking into Earth's atmosphere would be more tricky than their rattling deceleration in the comparatively soft Martian atmosphere. Still, the sheer wearing-down of their labors in the harsh cold dryness of Mars had sobered them all somewhat. When they returned home — or if — they would be wealthy, famous. Would they do this again?

"I might come back," Marc said.

"I, too," Raoul said, though without the conviction he had before.

"I am honest enough to say that I will not," Piotr said, grinning at them. "I will have a wealthy wife, remember."

They all laughed, maybe more than the joke deserved. The laughter, after a filling meal, served to remind them that they were a team, closer than any contracts could bring them. This was a highly public, commercial enterprise, of course, but none of it would work without a degree of cooperation and intuitive synchronization seldom demanded anywhere.

Ann looked at the others, their clothes emblazoned with the logos of mission sponsors, all quite soiled. Through the Consortium's endless marketing they had endorsed a staggering array of products. They were destined to be a team forever, no matter what happened in the future.

Marc said, "The metals, that's why I'm here. They'll be more important than life, in the long run."

Piotr: "I disagree. The asteroid belt is where we will go for metals. Mars is where we build a base to mine the asteroids. Going to be much cheaper to boost from here than anywhere else."

Raoul appeared from the pint-sized galley toting a bulb of coffee. "So we've just wasted our time looking for metals on Mars? Suits me. If we jettisoned all of the damned ore samples there'd even be room to breathe on the return."

Ann said, "We shouldn't be limited by what we think we know. Or what we think we're going to find. A biologist named Lovelock pointed out before the Viking landings that there was probably no life because the atmosphere was in chemical equilibrium with the surface. Spectroscopy from Earth showed plainly that there was nothing in it but boring CO₂ and nitrogen."

"Good argument, you have to admit," Marc said.

"But it assumed life would use the atmosphere as its buffering chemical medium. Unlikely, because it's so thin ..."

"That's what we found," Marc looked puzzled. They were co-authors on the microbial Nature paper, but they all knew the major work washers.

"Other life may have many ways of holding on deep underground. We can't reach it except through the vents."

When her news of life was beamed to Earth, the public had chewed over it, and decided that it was not all that exciting. Just a bunch of microbes, after all. The deeper issue of its relationship to Earth life had to wait until they got the samples home. Until then, the issue was the province of learned talking heads chewing over the implications. Time for that later.

They had been through all of this before, of course. In the course of two years you get to know each other's views pretty damn well, she reflected, and Raoul had his set look, jaw solid and eyes narrowed, already announcing his position.

The second liftoff trial was grim. Their lives were riding on the plume of scalding exhaust. She fidgeted with the microcams — Earth-side wanted four viewpoints, supposedly for engineering evaluation, but mostly to sell spectacular footage, she was sure.

"Let's go," Raoul called in a husky whisper.

The vehicle rose on a column of milky steam. The methane-oxygen burn looked smooth and powerful and her heart thudded as the ship rose into the burnt-blue sky. It was throttled down nicely, standing on its spewing spire as Raoul and Piotr made it hover, then drift sideways, then back.

"All nominal," Piotr said, clipped and tight.

"Control A 16 and B 14 integrated," Raoul answered. "Let's set her down."

And down they came, settling on the compressed column. The ship landed within 10 meters of the damp smear that marked the takeoff.

"Throttle down," came from Piotr in a matter-of-fact voice she did not believe for a minute.

Then she was running across the rocky ground, feet crunching, her cheers echoing in her helmet along with all the others, tiny over the com.

Celebration. Extra rations; they even ate the last Ego Bar. Joyful calls from Earth. The laconic way Piotr told the Airbus people that they would not be needing a ride home after all ...

Then the next morning. Assessment.

Now they had five days until liftoff and it stretched like forever. The rush to do the second test had kept them at it 16 hours a day, pouring their anxious energy into the other preflight procedures. After two years they functioned smoothly together, anticipating one another's needs wordlessly. The efficiency of true teamwork bore fruit: Now they were ahead of schedule. Ann worked alongside them and judged their mood and dreamed her own dreams. Home! The call of it was an ache in the heart. The cool green hills of Earth...

Still, she could not let go her own lousy ideas. She lay beside Piotr in the cold darkness and thought.

Leaving Mars ...

Behind her she felt the yearning of millions, of a whole civilization reaching out. Why had the issue of life here come to loom so large in the contemporary mind? It dominated all discussions and drove the whole prize-money science. Piotr and Raoul thought economic pay-offs would be the key to the future of Mars, but they were engineers, bottom-line men, remorselessly practical. Just the sort you wanted along when a rocket had to work, but unreliable prophets.

She suspected that the biologists were themselves to blame. Two

centuries before they had started tinkering with the ideas of Adam Smith and Thomas Malthus, drawing the analogy between markets and nature red in tooth and claw. The dread specter of Mechanism had entered into life, and would never be banished after Darwin and Wallace's triumphal march across the theological thinking of millennia. God died in the minds of the intellectuals, and grew a rather sickly pallor even among the mildly educated.

All good science, to be sure, but the biologists left humanity without angels or spirits or any important Other to talk to. Somehow our intimate connection to the animals, especially the whales and clumps and porpoises, did not fill the bill. We needed something bigger.

So in a restless, unspoken craving, the scientific class reached out — through the space program, through the radio-listeners of the Search for Extraterrestrial Life — for evidence to staunch the wound of loneliness. That was why their discovery of microbes satisfied no one, not even Ann. Mars had fought an epic struggle over billions of years, against the blunt forces of cold and desiccation, betrayed by inexorable laws of gravitation, chemistry and thermodynamics. Had life climbed up against such odds, done more than hold on? To Ann, survival of even bacteria in such a hellish dry cold was a miracle. But she had to admit, it left an abyss of sadness even in her. And there was still time ...

Morning. Four days to go. Over breakfast Ann signaled to Marc, took a deep breath, and made her pitch. The last few days' hectic work had pushed them hard.

More than that, it had nudged them across an unseen boundary in their feelings toward the trip. Despite what Marc and Raoul had said about returning, they all realized that this was a one-time experience. Once they left it would be all over.

Raoul looked up. "The vent trip again? I thought we laid that to rest. You didn't find anything the first time."

"Absence of evidence is not evidence of absence," she shot back.

Raoul frowned. "Besides, there isn't time. We're not packed up yet."

"We're ahead of schedule," said Ann.

Piotr cut in quickly. "Under normal circumstances, yes." He gestured at his cast. "With this, I'm clumsy. It takes longer to do everything." He looked at Ann. "I need your help."

At any time that a public admission of weakness cost him a lot, and it touched her, but she was determined not to be swayed. She refused to meet his eyes. Damn. Why did women always have to choose? He never would've asked that of a man.

In an impassioned tone, she used her Columbus argument — how could they go home when there was the chance they had only nibbled at the edges of discovery?

Marc came to her rescue. After days of grunt work, the scientist in him yearned for this last chance as much as she did. "We can do it in two days. We'll work here tomorrow morning, drive to the site and set up the pulleys by nightfall. Next day we'll explore the vent and come back. That gives us a full day to finish up here before liftoff." He looked at Piotr and Raoul. "We feel we have to do this."

Technically, the two scientists could amend mission plans if they felt it was warranted. Clearly they would do so this time.

Raoul looked pensive. "I want to go over the thruster assembly again. Something might need adjustment after the burn we just did." He hurried on. "But I can do it alone."

In a flash Ann understood that Raoul wished to take responsibility for the repairs, needed to have time alone with his handwork. He would be just as sluggish not to have two itchy scientists underfoot. Then he could take as much time as he liked, obsess over every detail.

There was a long moment. They skirted the edge of a rift. Finally Piotr nodded agreement. He had followed Ann's arguments carefully, hoping to be convinced. Now he snuggled back into mission commander mode. "Da. All right. Two days only."

Ann's heart soared. She flashed him a brilliant smile, leaned over and, ignoring mission discipline, gave him a big kiss. Spending one final night in a hellishly cold rover would be the price, but well worth it. She was going to explore the vent at last!

Part 3

She woke to the bitter tang of black Colombian perking in the pot, the scent mingling with a buttery aroma of pancakes, the sizzle of bacon in its lake of fat, all lacing in their steamy atmosphere to make a perfect moist dream —

And then she snapped awake, really awake — on the hard rover bunk, hugging herself in her thermoelectric blanket. Once all her waking dreams had been about sex; now they were about food. She wasn't getting enough of either, especially not since Piotr's aside.

The break would heal by the time they were on the long glide Earthward; their rations would not improve until they were back eating steak. She pushed the thought of meat out of her mind and sat up. First feelers of ruddy dawn laced a wisp of carbon dioxide cirrus high up; good. Today she got to burrow, at last.

"Hey Marc! I'll start the coffee."

No dallying over breakfast, though the hard cold that came through the rover walls made her shiver. A ruddy sunup was just breaking, giving them one final day of exploration. She peered out the viewport as she munches. They would run on in-suit rations today, no returning to the Spartan comforts of the rover.

They had set up the cable rig at the edge of the vent before sundown. By early light it still looked secure, anchored to three boulders. Marc didn't trust the soil here to hold so they had arranged cross-struts of their monofilament-based cabling to take their weight as they went down the steep incline. Metal cable was much too heavy to fly to Mars, and not necessary under the lighter gravity.

The first part was easy, just bucking over. The rock was smooth and of course dry. Even if vapor had spouted last night, it would never condense for long. The Martian atmosphere was an infinite sponge.

The vent snaked around and steepened as the pale light of late dawn from above lost out to the gloom. The rock walls were smooth and still about 10 meters wide. They reached a wide platform and the passage broadened further. Every 10 meters down they checked to be sure the cable was not getting fouled. They were both clipped to it and had to time their movements to keep from getting snarled.

They edged along the ledge cautiously, headlamps stabbing into the darkness. She was trying to peer ahead but her eyes were cloudy for some reason. She checked her face-plate but there was no condensate on it; the little suit circulators took care of that, even in the cold of full Martian night. Still, the glow from Marc's suit dimmed.

"Marc, having trouble seeing you. Your lamp die?"

"Thought I was getting fogged. Here —" He clambered over on the steep slope of the ledge and shone his handbeam into her face. "No wonder. There're drops of something all over your face-plate and helmet. Looks like water drops!"

"Water ...?"

"We're in a fog!" He was shouting.

She saw it then, a slow, rising mist in the darkness. "Of course! It could be a fog desert in here."

"A what?"

"Ever been out in a serious fog? There's not much water falling, but you get soaked anyway. There are deserts where it doesn't rain for years, like the Namib and the coast of Baja California. Plants and animals living there have to trap the fog to get water." She thought quickly, trying to use what she knew to think about this place. In fact, frogs and toads in any desert exploited a temperature differential to get water out of the air even without a fog. When they came up out of their burrows at night they were cooler than the surrounding air. Water in the air condensed on their skin, which was especially thin and permeable.

Ann peered at the thin mist. "Are you getting a readout of the temperature? What's it been doing since we started down?"

He fumbled at his waist pack for the thermal probe, switched it to readout mode. "Minus 14, not bad." He thumbed for the memory and

nodded. "It's been climbing some, jumped a few minutes ago. Hm. It's warmer since the fog moved in."

They reached the end of the ledge, which fell away into impenetrable black. "Come on, follow the evidence," she said, playing out cable through her clasps. Here the low gravity was a big help. She could support her weight easily with one hand on the cable grabber, while she guided down the rock wall with the other.

"Evidence of what?" Marc called, grunting as he started down after her.

"A better neighborhood than we've been living in."

"Sure is wetter. Look at the walls."

In her headlamp the brown-red rock had a sheen. "Enough to stick!"

"I can see fingers of it going by me. Who woulda thought?"

She let herself down slowly, watching the rock walls, and that was why she saw the subtle turn in color. The rock was browner here and when she reached out to touch it there was something more, a thin coat. "Mat! There's a mat here."

"Algae?"

"Could be." She let herself down farther so she could reach that level. The brown scum got thicker before her eyes. "I bet it comes from below."

She contained her excitement as she got a good shot of the scum with the recorder and then took a sample in her collector rack. Warner fog containing inorganic nutrients would settle as drops on these cooler mats. Just like the toads emerging from their burrows in the desert? Analogies were useful, but data ruled, she reminded herself. Stick to observing. Every moment here will get rebashed a million-fold by every biologist on Earth... and the one on Mars, too.

Marc hung above her, turning in a slow gyre to survey the wide vent. "Can't make out the other side real well, but it looks brown, too."

"The vent narrows below." She reeled herself down.

"How do they survive here? What's the food source?"

"The slow-motion upwelling, like the undersea hydrothermal vents on Earth."

Marc followed her down. "Those black smokers?"

She had never done undersea work but was of course aware of the sulfur-based life at the hydrothermal vents. Once it was believed that all life on Earth depended on sunlight, trapped by chlorophyll in green plants and passed up the food chain to animals. Then came the discovery of sunlight-independent ecosystems on the ocean floor, a fundamental change in a biological paradigm. The exotic and unexpected vent communities were based on microbes that harnessed energy from sulfur compounds in the warm volcanic upwelling. Meter-long tube worms and ghostly crabs in turn harvested the bacteria. The vent communities on earth were not large, a matter of meters wide before the inexorable cold and dark of the ocean bottom made life impossible. She wondered how far away the source was here.

In the next 50 meters the scum thickened but did not seem to change. The brown filmy growth glistened beneath her headlamp as she studied it, poked it, wondered at it.

"Marsmat," she christened it. "Like the algal mats on Earth, a couple of billion years ago."

Marc said wryly, puffing. "We spent months looking for fossil evidence, up there in the dead sea beds. The real thing was hiding from us down here."

The walls got closer and the mist cloaked them now in a lazy cloud. "You were right," Marc said as they rested on a meter-wide shelf. They were halfway through their oxygen cycle time. "Mars made it to the pond scum stage."

"Not electrifying for anybody but a biologist, but something better than individual soil microbes. It implies a community of organisms, several different kinds of microbes aggregated in slime — a biofilm." She peered down. "You said the heat gradient is milder here than on Earth, right?"

"Sure. Colder planet anyway, and lesser pressure gradient because of the lower gravity. On Earth, 1 kick deep in a mine it is already 50 degrees C. So?"

"So microbes could probably survive farther down than the couple of kicks they manage on Earth. They're stopped by high heat."

Fireflies did it with an enzyme, luciferase, an energy-requiring reaction she had done in a test-tube a few thousand years ago in molecular bio lab. Glow worms—really fly larvae, she recalled—hung in long strands in New Zealand caves. Some tropical fungi glow in the dark.

"Maybe."
 "Let's go see."
 "Now? You want to go down there now?"
 "When else?"
 "We're at oxy turnaround point."
 "There's lots in the rover."
 "How far down do you want to go?"
 "As far as possible. There's no tomorrow.
 Look, we're here now, let's just do it."
 He looked up at his readouts. "Let's start back while we're deciding."
 "You go get the tanks. I'll stay here."
 "Split up?"
 "Just for a while."
 "Mission protocol —"
 "Screw protocol. This is important."
 "So's getting back alive."
 "I'm not going to die here. Go down maybe 50 meters, tops. Got to take samples from different spots."
 "Piotr said —"
 "Just go get the tanks."
 He looked unhappy. "You're not going far, are you?"
 "No."
 "OK then. I'll lower them down to the first ledge if you'll come back that far to pick them up. Then I'll come down, too."
 "OK, sounds fine. Let's move."
 He turned around and started hauling himself up the steep wall.
 "Thirty minutes, then, at the first ledge."
 "Yeah, fine. Oh, and bring some batteries, too. My handbeam's getting feeble."
 "Ann ..."

"See you in 30 minutes," she said brightly, already moving away. Marc kept going. The slope below was easy and she inched down along a narrow shelf. Playing out the cable took her attention. Methodical, careful, that's the ticket. Especially if you're risking your neck deep in a gloomy hole on an alien world.

She felt a curious lightness of spirit — she was free. Free on Mars. For the last time. Free to explore what was undoubtedly the greatest puzzle of her scientific life. She couldn't be cautious now. Her brother Bill flashed into her mind. He took life at a furious pace, cramming each day full, exuding boundless energy. They went on exploring trips together as children, later as nascent biologists. He was unstoppable: up and out early, roaming well after dark. There was never enough time in the day for everything he wanted to see. "Slow down, there's always tomorrow," people would tell him.

But his internal clock had served him well, in a way. He was cut down at age 22 when his motorcycle slid into a truck one rainy night when sensible people were home, warm and dry. Looking around the church at his funeral, Ann felt he'd lived more than most of the middle-aged mourners. Bill would've approved of her right now, she was sure.

A flicker from her handbeam brought her back. She looked down, shook it. The beam brightened again. Damn, not now.

The mat was thicker here, as she'd guessed it would be closer to the elusive surface.

She landed on a wide ledge, moved briskly across it, mindful of time passing. The floor was slippery with Marsmat but rough enough so she could find footing. Sorry, she said silently to the mat, but I've got to do this.

Her handbeam flickered again, died. She shook it, bent her head to look at it with the headlamp, then felt a sudden hard blow to her forehead, heard the headlamp shatter. She fell backward, in slow-motion but inexorably, nothing to grab.

Her wrist hit first as she landed and she dropped the handbeam. She lay there for a moment, waiting for the surprise to go away. Must've run into an overhang. It was pitch dark. Where was her damned lamp? There was a faint glow to her left. That must be it. She started to get up, noticed a feeble luminescence ahead of her. Confused, she sat back down. Take this carefully.

All around her, the walls had a pale ivory radiance.

She closed her eyes, opened them again. The glow was still there. — No, not the walls — the Marsmat. Tapestries of dim gray luminescence.

She reviewed what bits she remembered about organisms that give off light. This she hadn't boned up on. Fireflies did it with an enzyme, luciferase, an energy-requiring reaction she had done in a test-tube a few thousand years ago in molecular bio lab. Glow worms — really fly larvae, she recalled — hung in long strands in New Zealand caves. She remembered a trip to the rainforest of Australia: Some tropical fungi glow in the dark. Hmm. Will-o-the-wisps in old graveyards, foxfire on old wooden sailing ships ... er head. Waves breaking at night into glowing blue foam during red tides in California. Those are phosphorescent diatoms. What else? Thermal vent environments ...

Deep-sea fish carried luminescent bacteria around as glowing lures. That's it. The lab folks had fun moving the light-producing gene around to other bacteria. Okay. So microbes could produce light, but why here? Why would underground life evolve luminescence?

Bing bing. The warning chime startled her out of her reverie. She flicked her eyes up. The oxygen readout was blinking yellow. Thirty minutes reserve left. Time to go back.

As she picked herself up she brushed against her handbeam. She picked it up but left it off. Navigating by the light of the walls was like hiking by moonlight.

Pulling herself up gave her time to think, excitement to burn in muscles that seemed more supple than usual. Yes, it was warmer here. She turned her suit heater down. Life hung out in the tropics.

Before she reached the tanks, she heard Marc's impatient voice. "Ann, where are you?"

"On my way. Pretty close." She rounded a jut in the vent walls, into the glare of his lights. The walls faded into black.

"Where were you? You're way late, damn it. The tanks were here on time — hey, where's your headlamp?"

"Ran into an overhang. Smashed it. Marc —"

"Headlamp too? What'd you do — grope your way back? Why didn't you call?" He was clearly angry, voice tight and controlled.

"I found, I found —"

"Ann, calm down, you're —"

"Turn off your lamps."

"What?"

"Turn off your lamps. I want you to see something."

"First we switch your tank."

She sighed. It was just like Marc to fuss over details. Looking down at the sidewalk for pennies and missing the rainbow.

When she finally got the lamps off he could see it too. There was a long moment of utter shock and he seemed to know it was better to say nothing.

Then she heard something wrong. The faint hissing surprised her. Mission training reasserted itself.

"What's that? Sounds like a tank leaking." Automatically she checked her connectors. All tight. "Marc? — check your tank."

"I'm fine. What's the matter?"

"Hear something, like a leak."

"I don't hear anything."

"Be quiet. Listen." She closed her eyes to fix the direction of the sound. It came from near the wall. She shone her handbeam on the empty tank, bent down low and heard a thin scream. Oxygen was bleeding out onto the Marsmat.

"Damn. Valve isn't secured." She reached down to turn it off. Stopped — "What?"

The Marsmat near the tank was discolored. A blotchy, tan stain.

"Damn! We've damaged it!" She knelt down to take a closer look, carefully avoiding putting her hand on the wall.

"What happened?" Marc took one long step over, understood at a glance. "The oxygen?"

"Uh-huh. Looks like it."

"What a reaction. And fast! No wonder there was nothing in the first vent. You were right about that."

"Oxygen's pure poison to these life forms. It's like dumping acid on moss. Instantaneous death."

He looked around wonderingly. "We're leaking poison at them all the time in these suits."

She nodded. Stupid not to see it immediately, really. Like SCUBA gear, their suits vented exhaled gases at the back of the neck, mostly oxygen and nitrogen with some carbon dioxide. A simple, reliable system, and the oxygen was easily replaceable from the Return Vehicle's chem factory.

Marc shook his head, sobered. "Typical humans, polluting wherever we go."

"If the stuff is this sensitive, we'll have to be really careful from now on." Ann straightened up carefully and backed away from the lesion.

They stood for a long moment in inky blackness, letting their retinas shed the afterimage of the lamps. Finally Marc asked, "Where's the light coming from?"

"Marsmat glows. Phosphoresces, is more correct."

"How can it do that?"

"Don't know. The more interesting question is why."

They knew now that time and oxygen would set the limits. They had this day and were to return to the ship tomorrow. Team loyalty.

"Plenty of oxy up there," Marc said as they rested and ate lunch — a squeeze-tube affair she hated, precisely described in one of her interviews as eating a whole tube of beef-flavored toothpaste.

"So we trade tanks for time."

"Piotr's gonna get miffed if we don't check in at the regular time."

"Let him." She wished they had rigged a relay antenna at the vent mouth. But that would have taken time, too. Tick tick tick.

"I don't want us to haul out of here dead tired, either."

"We'll be out by nightfall."

"We won't be so quick going out."

Field experience had belied all the optimistic theories about working power in low gravity. Mars was tiring. Whether this came from the unrelenting cold or the odd, pounding sunlight (even after the UV was screened out by faceplates), or the simple fact that human reflexes were not geared for 0.38 gee, or some more subtle facet — nobody knew. It meant that they could not count on a quick ascent at the end of a trying day.

"You want geological samples, I want biological. Mine weigh next to nothing, yours a lot. I'll trade you some of my personal weight allowance for time down here."

He raised his eyebrows, his eyes through his smeared faceplate giving her a long, shrewd study. "How much?"

"A kilogram per hour."

"Ummmm. Not bad. Okay, a deal."

"Good." She shook hands solemnly, glove to glove. A fully binding guy contract, she thought somewhat giddily.

"Piotr's counting on using some of your allowance to drag back more nuggets and 'jewels,' y'know."

"It's my allowance."

"Hey, just a friendly remark. Not trying to get between you two."

Innumerable nosy media pieces had dwelled on the tensions between a crew, half married and half not, complete with speculations on what two horny, healthy guys would feel like after two years in a cramped hab with a nutting couple just beyond the flimsy bunk partition. All that they had scrupulously avoided.

So far the answer was, nothing much. Raoul and Marc undoubtedly indulged in gaudy fantasy lives and masturbated often (she had glimpsed a porno video on Raoul's slate reader) but in the public areas of the hab they were at ease, all business.

There was no room for modesty in the hab, four people in a small condo for two years. So they unconsciously adopted the Japanese ways of creating privacy without walls. They didn't stare at each other, and didn't intrude on another's private space unless by mutual agreement.

Nobody had thought much about what the hab would be like if the newlyweds — well, it had been well over two years now, most of that time in space — got into a serious spat. Maybe on the half-year flight home they would find out. She would worry about that then, for right now —

"Hey, we're eating into my hard-bought hours."

They returned to the ledge where Ann had her accident, two hundred meters farther in. On the other side of the fortuitous overhang they found a pool covered with slime on a ledge. It was crusty black and brown stuff and gave reluctantly when she poked it with a finger.

"Defense against the desiccation," she guessed.

Marc swept his handbeam around. The mat hung here like drapes from the rough walls. "Open water on Mars. Wow."

"Not really open. The mat flows down, see, and covers this pool. Keeps it from drying out. Saving its resources maybe?"

She scooped out some of the filmy pool water and put it under her hand microscope. In the view were small creatures, plain as day.

"My God. There's something swimming around in here. Marc, look at this and tell me I'm not crazy."

He looked through the scope and blinked. "Martian shrimp?"

She sighed. "Trust you to think of something edible. In a pond this small on Earth there might be fairy shrimp, but these are pretty small. And I don't even know if these are animals."

She hurried to get some digitals of the stuff. She scooped some up in a burlap vial and tucked it into her pack. Her mind was whirling in elation. She studied the tiny swimming things with breathless awe.

So fine and strange and why the hell did she have to peer at them through a smudged helmet? They had knobby structures at one end heads? Maybe, and each with a smaller light-colored speck. What?

Could Mars life have taken the leap to animals — a huge evolutionary chasm? These could be just mobile algae colonies — like volvox and other pond life on Earth. Whatever they were, she knew they were way beyond microbes. She bent down over the pool again, shone her handbeam at an angle. The swarm of creatures was much thicker at the edges of the Marsmat — feeding? Or something else?

She couldn't quite dredge the murky idea from her subconscious. The arrangement with the mat was odd, handy for the shrimp. What was the relationship there? Some kind of symbiosis? And how did the swimming forms get to the pool?

They climbed down from the ledge. As they descended, the mist thickened and the walls got slick and they had to take more care. The cable was getting harder to manage, too. She could not stop her mind from spinning with ideas.

On Earth, hydrothermal vent organisms kilometers deep in the ocean photosynthesized using the dim reddish glow from hot magma. The glow becomes their energy source. Could some Martian organisms use the mat glow? Wait a minute — the shrimp had eyes! Or did they?

"Marc, did you notice anything peculiar about the shrimp?"

He paused before answering. "Well, I don't know what they should look like. They looked sorta like the shrimp I feed my fish at home."

"Did you notice their eyes?"

"Uh ..."

"The knobby ends, those had lighter specks, remember?"

"Yeah, what about them?"

"So you saw them too."

"Why, what's the matter — Oh."

"Right?"

"I see, they shouldn't have eyes."

"Good for you. I'll make a biologist out of you yet. On Earth, cave-dwelling organisms have lost their eyes. Natural selection forces an organism to justify the cost of producing a complicated structure. You lose 'em if you don't use 'em."

"So if they have eyes —"

"On Earth, we'd say they were recent arrivals from a lighted place, hadn't had time to become blind."

"But that's impossible. The lighted parts of Mars have been cold and dry for billions of years. Where would they have come from?"

"I agree. So my next choice is that it's not dark enough here to lose the eyes. But the idea of some kind of transfer with the topside peroxide microbes is worth thinking about."

"That glow is pretty dim."

"To us, maybe. We're creatures from a light-saturated world. Our eyes aren't used to these skimpy intensities. Closest parallel on Earth to these light levels are the hydrothermal vents. There are light-sensitive animals down there, even microbes able to photosynthesize."

"Maybe they're not even eyes."

"They're light-sensitive. The critters clustered under the beam from my 'scope."

"Wow."

"I need more information, but at the very least it suggests that the glow is permanent, or at least frequent enough to give some advantage to being able to see. And that means there should be something that can use the glow as an energy source. Maybe the mat is symbiotic — a cooperation between glowing organisms and photosynthesizers?"

"Yeah ... That suggests the glow is primary. What's it for?"

"Don't know, just guessing here."

"Curiouser and curiouser, as Alice said."

"I didn't know boys read Alice and Wonderland."

"It seems to fit what we're doing."

"Down the rabbit hole we go, then."

Below the level of the pool ledge were twisty side channels to the vent. These ran more nearly horizontal, and they explored them hurriedly, clumping along until the ceiling got too low. No time to waste crawling back into dead ends, she figured. They headed back to the main channel and then found a broad passage that angled down. It was slick and they had to watch their footing.

The mats here were like curtains, hanging out into the steady stream of vapor from the main shaft of the vent. Some seemed blinged to spread before the billowing vapor gale. Ann was busy taking samples and had only moments to study the strange, slow sway of these thin membranes, flapping like slow-motion flags. "Must be maximizing their surface area exposed to the nutrient fog," she guessed.

"Eerie," Marc said. "And look how wide they get. There's a lot of biomass here — wonder if any of it's edible."

At turns in the channel the mats were the size of a man. She took a lot of shots with her microcam, hoping they would come out reasonably well in their lamp beams. The mats were gray and translucent. Under direct handbeam she could see her hand through one.

How did these fit in with the peroxide-processing microbes on the surface? Clearly these mats harvested vapor; did they somehow trade it with the peroxide bugs, water and methane for the racy silica of peroxide? She had a quick vision of an ecosystem specialized to use what it had: peroxides aplenty above, and ice below, awaiting a lava flow to melt it.

Did life negotiate between these resource beds? Oxides cooked by the searing sun, with microbes specialized to gather their energy. Those microbes must have evolved after the great dryness came,

when UV sizzled down and drove deeper all that could not adapt to it.

Yet below, where water still lurked, dwelled forms that owed their origin to the warm, moist eras of the Martian antiquity.

The mats — and what else, in such labyrinths as this, all around the globe? — transacted their own business with the peroxide eaters. They could harvest the moisture billowing from heat below, and perhaps melt the permafrost nearby. At the edges of Earth's glaciers lived plants that actually melted ice with their own slow chemistry.

The thermal vents and their side caverns could be extensive. With an exposed surface area as big as Earth's, there was plenty of room for evolution to experiment.

Nothing like this pale ivory cavern on Earth, ruled as it was by boisterous, efficient aerobic life. To escape the poisonous reach of oxygen, anaerobes retreated to inhospitable niches like hot springs and coal mines. In that infertile ground they survived, but remained as microbes, spawning no new forms. On Mars, any oxygen-loving forms would have died out when the planet lost its atmosphere. Here the anaerobes persisted, and evolved new forms, maybe the closest analogy was to the marsupials in Australia. Marsupials breed more slowly than true placental animals, and thus were eliminated all over the Earth except for the huge island of Australia. Free of competition, they populated an entire continent, evolving completely unique forms such as kangaroos, wombats and the duckbilled platypus. What were the equivalents on Mars?

Ann gently caressed a mat as it lazily flowed on the vapor breeze. Plants, flourishing in the near-vacuum. She could never have envisioned these...

Yet in the edges of her vision she sensed something more. She thought for a moment and said, "Turn off your lamps."

"Mine's getting pretty low," he remarked as they plunged into blackness.

The glow gradually built up in their eyes. "There's a lesion on the closest mat," said Marc.

She swung gently over, peered at it. "It's the same shape as the damage we did above." The mat around the wound shape glowed more brightly with pale phosphorescence. It seemed to be changing as she watched. "Look at it out of the corner of your eye," she said. "See?"

"It's spreading downwards."

The mats were growing ever larger as they went lower. She leaned over into the vent and peered around. "The glow increases below." They looked down the vent.

"It's definitely brighter down there."

"Let's go." They descended carefully, playing out line. Their lamps washed the mats in glare that seemed harsh now. Twenty meters down she said, "Lamps off again," as they rested on a shelf.

When her dark vision came back her eyes were drawn to a splash of light. "Damn! How — ?"

"It's the same shape again."

A ninnicking image. Parrots imitate sounds, this mat imitates patterns imposed on it, even destructive ones. Why?

He drewled, "I'd say the question is, how the hell?"

"The mat here learned about the wound above."

"Okay, they're connected. But why the same shape?"

She sighed. "It's a biological pictograph. I have no idea why, but I am sure that any capability has to have some adaptive function."

"You mean it has to help these mats survive."

"Right."

They descended again, quickly; time was narrowing. The image of the lesion repeated on successively lower mats twice more, five meters apart.

She gazed back up. The blurred gleaming above had faded. So it was not just a simple copying, for some pointless end. "It's following us down."

"Tracking us?"

"See for yourself, up there — the image is nearly gone, and the one next to us is brightening."

"Are you implying it knows we're here?"

"It seems to sense what level we're on, at least."

"This one is stronger than the others."

"I think so too. Brighter the deeper we go. The glow is purely chemical, some signaling response I would guess, and the denser vapor here deep in the vent helps it develop."

"Signaling?" Marc sounded puzzled.

"Maybe just mimicking. Light would be the only way to do it here. It couldn't use chemical packets to signal downwards because of the updrafts of vapor. Sound could go either up or down, but it doesn't carry well in this thin atmosphere."

His voice was strained in the blackness. "There's got to be a simple explanation."

"There is, but it doesn't imply a simple organism."

"Maybe it's ... signaling something else..."

"And if it's brighter the deeper we get, maybe that means... something below."

They went one more time down into the darkness. Her muscles ached and her breath came in ragged gasps. At the next ledge down the lesion image began to swell into a strong, clearer version.

Something beyond comprehension was happening here and she could only struggle with clumsy speculations as she worked. Somehow the mat could send signals within itself. There were many diaphanous flags and rock-bagging forms and somehow they all fit together, a community. They used the warmth and watery wealth here and could send signals over great distances, tens of meters, far larger than any single mat. Why? To sense the coming pulse of vapor and make ready? A clear survival value in that, she supposed. Could organisms evolve such detailed response in this harsh place?

And how did these fit with the peroxide-eating microbes? Could they somehow work together? Darwin had his work cut out for him here...

With their lamps off she took video shots of the ghostly lesion images with her microcam, though she was pretty sure the level of illumination was too low to turn out. She would memorize all this

Earthside was aboil with negotiations between the Consortium and Airbus, with lawyers angrily slapping writs on each other, over fuel four hundred million miles away. Airbus argued that the Consortium team failed if it could not get home without Airbus's help: They should at least split the \$30 billion prize money.

and write it down in the rover. Careful notes...

"We're out of time."

She gazed down and saw at the very limit of the weak lamp-light bugger things. Gray sheets, angular spires, corkscrew formations that stuck out into the upwelling gases and captured the richness...

She blinked. How much was she seeing and how much was just illusion, the product of poor seeing conditions, a staid helmet view, her strained eyes—

"Hey. Time."

She felt her fatigue as a slow, gathering ache in legs and arms. Experience made her think very carefully, being sure she was wringing everything from these minutes that she could. "How far down are we?"

Marc had been keeping track of the markings on the cable. "Just about one klick."

"What's the temperature?"

"Nearly 10. No wonder I'm not feeling the cold."

"The thermal gradient here is pretty mild. This vent could go down kilometers before it gets steam-hot. And we've just reached the cavern level."

"Ann..."

"I know. We can't go farther."

"It'll be a long, tough climb out. Must be dusk up there by now."

Getting deathly cold on the surface, and fast, yes. Automatically she cut a small sample out of the closest mat and slipped it into the rack. A strange longing filled her.

"I know. I'm not pushing for more, don't worry. Biologists need oxygen, too."

They got the rover back just before they could've been accused of being late, tired and cold but still elated by their discoveries. Over a late dinner they briefed Piotr and Raoul, then squirted a summary Earthside, along with the digitized readout from her microcam. Now, whatever happened to them at liftoff, the information was safe.

Ann and Piotr made love one last time on Mars. Piotr had been worried about her. He held her close afterward long after she drifted into sleep. After a few hours they were all up again, in a hurried rush to get ready. There was plenty more to do for launch, and months to cancel the sleep debt.

As she worked alongside the others, she was struck again at how well they all worked together. Even under enormous time pressure they partitioned the duties with little or no overlap. It all went so smoothly that by noon they were just about finished. They celebrated at lunch, finishing up with a few saved delicacies.

Despite a mountain of last-minute details, Ann's thoughts kept flashing back. Something about the team related to the puzzle of the vent life, but she couldn't quite get it. Oh well, she'd have six months to think about it, starting in just a few hours.

Piotr made her stick to their deal on mass allowance. She spent pointless time worrying about which of her sample racks to leave and fretted and even begged Piotr (with no luck) — and then thought of a last trick.

Once they had the old hab stripped and their gear transferred, she did the last rites of sealing up the worn little apartment they had now lived in for over two years. She would be perfectly happy to never set foot in it again. Piotr had already set the power reactor to low, so it could still drive the communications with Earth. She made sure the TV microcameras were pointed to follow the

liftoff. If they crashed at last Earthside would see what had gone wrong. She brought the last personal gear over and then — her idea — had the men pass their pressure suits out through the ship's lock. Leaving the suits behind saved a hundred kilos, neatly taking care of all her sample racks.

They had to lift at night to make their launch window. Escape energy for Mars was less than twenty percent of Earth's, which made the entire process of making their fuel from Martian carbon dioxide workable — they didn't need to make a lot. But even making the five km/sec escape velocity took a lot, so the entire flight plan, including the final boost to Earth, cut matters fairly fine. They had stayed the full 550 days to make this minimum energy window.

She was strangely calm, waiting in her couch in the cramped Return Vehicle hab when Piotr started the engines.

"Pressurizing all OK."

"Flow regular."

"Max it."

"On profile."

Cottony clouds billowed outside, licking up past the square port. She could see their liftoff by turning her head and the hills seemed close in the deep blackness of Martian night.

They climbed quickly in a roaring, rattling rush, a feeling like being pressed down by a giant, yet she knew that meant it was all going well. Raoul called out altitudes, speeds, voice calm and flat.

She felt a sadness as they angled over at several kilometers up. Mars lay in its frigid night below. Then she saw it.

The entire moment lasted probably no more than five seconds. In memory it became a long, stretched syllable of time to which she was the sole witness.

Her microcam was irretrievably tucked away. The others were busy with the launch, shouting with relief and joy and the boundless releasing pleasure of knowing that after two years they were going home. No witnesses.

She had no time to think about what she had seen because the trouble started as soon as they were in orbit. It came through her earphones in Piotr's pinched voice: "Losing pressure, Tank 2."

The methane tank had a rupture. "Damn plumbing again," Marc said, trying to be casual, but they all knew this was bad.

In the end it was their teamwork that saved them again.

Resealing the tank using what few tools they had left from Raoul's kit was a tense, precise operation. She had to go outside in the light, full-vac suit and serve as general gofer while Raoul and Marc blocked the venting of methane, then made a makeshift repair. Meanwhile, Piotr made orbital calculations.

The story of those days would make Raoul into the true media hero of the expedition. Not that she minded in the least, for indeed, he had saved them all.

But they had lost a lot of methane. Calculations showed they could boost for Earth, but would not have enough to fully decelerate once they got there. Burning up during aerobraking, in a desperate attempt to lose their incoming velocity, was a very real possibility.

So they rethought, frantically. Piotr was the first to see the only plausible solution: the booster fuel pre-positioned in high Mars orbit by their competitors, Airbus. He put together a sequence of five burns that took them into a long, elliptical matching orbit with the Airbus tanks.

Earthside was aboil with negotiations between the Consortium and Airbus, with lawyers angrily slapping writs on each other, over fuel four hundred million miles away. Airbus argued that the Consortium team failed if it could not get home without Airbus's help. They should at least split the \$30 billion prize money. This provoked a brief flurry within the government. NASA announced that the terms of the contest only specified that the first team returning successfully from Mars would be the winner. Anything else was between Airbus and the Consortium.

Intense public interest greased the negotiations. Airbus couldn't refuse the team their only chance home with the whole world watching. And none of the negotiators could have stopped the team from taking the fuel anyway. It was like piracy on the high seas two hundred years before.

Finally they agreed. Overnight, a billion dollars changed hands. Deep in the bowels of a Swiss bank, a dolly heavily loaded with gold bars was wheeled from one vault to another.

The two-bulbed booster looked surprisingly like a huge metal insect as they approached. Hanging below it was the rusty dry abyss of Mars, ripe for exploration.

Ann shot the docking sequence with her microcam, a concession to the publicity-mad Consortium. Ground Control had wanted her to take extensive footage of the whole incident, but she had refused so far. It was too much to ask that they star in a home movie that might end in their deaths, and besides, she was too busy helping with the repairs.

The team offloaded tons of methane from the booster reserves. That did not leave enough for the Airbus crew to return, which meant that Airbus had to send a second, smaller methane tank to rendezvous — no mean feat of orbital mechanics and navigation. That drama would play out years later, of course, for the Airbus team had a year and a half, just like the Consortium, to explore the surface of Mars before risking return.

The refueling worked, though just barely. Bederiving details such as incompatible couplings in the hoses and frozen joints in high vacuum cost them time and nerves. They alternately cursed the hardware and enjoined each other through the rough spots.

But they got the methane they could not live without. The entire return orbit had to be recalculated, and of course they had missed their optimum time to catch the lowest-energy trajectory. That would cost them more fuel at Earth rendezvous, but at least they had it to burn.

When they were under way they all slept most of the first week, not wholly from fatigue, but from the need to escape the sense of a closing vise around their lives. Recovery was slow. But then she had time to think, to recall those first moments of liftoff.

They had half a year of waiting before their aerobrake into Earth's swampy air. As soon as they could they got the ship spinning, using the last stage rocket as counterweight. This brought back Mars-level gravity and in the months ahead they gradually spun it to higher angular speeds, building up for the return to Earth.

Anna thought a lot without talking to the others. Marc processed his data from the vent and they were all pleased to discover that the vapor boiling out had plenty of hydrogen and methane — a ready resource for later expeditions. If somehow they could land a robot vehicle next to a vent and trap its exhalations, Earthside wouldn't even need to ship hydrogen to make fuel here.

Her samples were sealed away, her equipment on the planet below, so she could not work on the mat tissues or the shrump or any of the rest of it. A treasure for others, though of course she would get to direct a lot of the work. They sure as hell owed her that; better, it was in her contract. There was no place in the Return Vehicle lab to rig a sealed work vessel for even simple studies. So she was left to her hypotheses.

Back to basics, she decided. Try to see the whole planet from a Darwinian perspective.

She couldn't prove any of her speculations, of course. Not without knowing more about Martian DNA. She suddenly realized what to look for, once she reached the labs of Earth.

The DNA code might just hold the answer. Earth's code was degenerate: a mistake in the coding was like a change in spelling that didn't always alter the meaning. In a sense, there were alternate spellings for the same amino acid. And of course proteins themselves have regions where a substitution of a different amino acid doesn't really matter. Room for error, with no consequences.

She had always thought that was a response to a rapidly evolving planet with lots of mutagens: a Darwinian hotbox world. So a rich world struck a balance between conservatism and experimentation, achieved over billions of years on a planet where evolution's ladle was always spinning. Climatic fluctuations changed the rules of survival, flipping from warm to cold and back again. It led some to postulate the Red Queen hypothesis: You have to keep running to stay in the same place, the entire biota evolving in fast lock-step to avoid being left behind. The pace was gruel-

ing, and a species lasted on average only a million years or so before running out of steam.

What would happen on Mars, where there may have been only one golden age of evolution, and a long twilight of one-way selective pressure? The environment got ever colder, ever drier, the atmosphere ever thinner. But there were also brief eras of warmth, when water or at least mud flowed on the surface. What then?

Ten days later they finally celebrated their victory over lunch. They had stopped holding their breaths and were beginning to relax in the tiny social room of the circular hab. The others had begun to write their memoirs. There would be four solid best-sellers out of this, no problem, already under contract with fat advances paid.

Amateur writers all, they were trying out titles on each other. "I think I'll call mine Mars or Bust," said Marc.

That got a laugh from Raoul. "More like Mars and Busted, don't you think?"

"I know. Mars or Bust." They howled with laughter, delayed release from earlier terrors.

What about *The Long Glide Home*? said Marc when they had calmed down.

"Together on Mars," suggested Piotr, grinning at Ann. Something about the titles caught Ann's attention. Mars had a long cold drying out ...

She sank back into her thoughts. Now that you can't grab any more samples, let the theory lead you ...

On Mars, maybe the DNA code would become more conservative, simpler and more precise? After all, the direction of evolution for a billion years had been the same: colder and drier. Without sudden climatic shifts, the need for degeneracy disappeared.

Every error would be significant. The price was that evolution must be slower. Even on Earth, most mutations were unfortunate, spelled gibberish, and killed the organism. Only a very few were useful.

On Mars, the chance of a successful mutation would be much smaller. Then what would happen if Marc was right, and there had been a few brief intervals of warmer, wetter conditions? Evolution couldn't work fast enough to take advantage of the new conditions.

So ... what else?

Could cooperation have become the winning rule? She looked around the tiny room at her teammates. Four tough-minded types with different skills, fitting together into an efficient whole. They had survived two near-disasters and a grueling 18 months in a freezing, near-vacuum rustbowl because of that efficiency. Piotr had finally been picked, instead of Janet, because his range of talents, his characteristics, were what the rest of the team needed. That's what her subconscious had been trying to tell her.

Could it work on a planet-wide scale?

Find a partner with the desired characteristic, instead of trying to evolve it yourself.

A short period of wet and warm brought the mats out of the vents and into the lake beds, where they interacted with the peroxide forms, perhaps incorporating them into the biofilm. Photosynthetic organisms loosed from the mat — those shrimp — could colonize the seas, making hay in the brief summer while the atmosphere lasted.

Life that found partners to help it maximize the wet-era opportunities would be successful. Glowing mats and photosynthetic microbes, free-swimming forms and protective films, peroxide-eaters and watery membranes, all somehow trading their resources.

An entire ecology, driven far underground, nonetheless finding a path through the great Darwinowing ...

She did some quick calculations and saw that the available volume of warm, cavern-laced rock below Mars was comparable to the inhabitable surface area of Earth. Room to try out fresh patterns.

But always meshed into the spreading network of organisms great and small ... evolution in concert. Organisms still died their pitiful deaths, genes got erased — but the system could be more interlaced, she saw, deep in the guts of a slumbering world.

Maybe that explained what she had glimpsed at liftoff.

Her last look down at the frigid Martian night had caught a smudge of light toward the horizon. A pale white cloud, linear, fuzzier at one end. It seemed to point downward. Then she saw that she was looking less north, and the cloud glowed. A pale ivory finger of illumination spiked up from the surface, broadening.

From the vent, she knew instantly — an impossibly brilliant outpouring. Then the ship took them up and away and Mars fell into its long cold night again.

To poke such a glistening probe of light into the sky must have cost the matting enormous energies, she thought. To make it, the vent would first have to be expelling a gusher of vapor. Then the mats would all have to pour their energy into the pale glow, coherently.

What coordination ... and what control, over the venting of vapor itself? Could life have attained such levels?

On Earth, the anaerobic forms had never evolved beyond simple forms, bacteria. They had been competing with the hefty, poisonous oxygen-users, of course. On Mars that was no issue; the creatures of methane and hydrogen had prevailed, for billions of years, beneath the steady, cruel press of a world slowly bleeding its air and water into the hard vacuum above.

Somehow, she knew intuitively, the anaerobes had done it. They had evolved an intricate network. Peroxide eaters somehow traded with the harvesters of vapor. And they communicated — surely, for why else would they evolve light signaling?

The pearly lance, jutting up: A signal? A celebration? A mating dance? With so much energy expended, there must be some purpose.

It was natural to see it as a pointed message, but there are many behaviors in biology that defy easy logic. She knew what she would like to believe, but ... Science is a systematic way to avoid fooling yourself, after all.

So much to guess ...

They were three weeks out before Ground Control sent the liftoff pictures from the microcams she had positioned. One had pointed nearly north, along their trajectory. The rocket plume had blazed across the hard blackness and then vanished from the cam's fixed view. But the cam kept on recording because there was still something to see.

They had caught it. The ivory plume, towering kilometers into the sky, mingling with the gleaming stars.

What's this? — Earth wanted to know.

She smiled. Memory was always tricky, unreliable. That was why they trained you to observe and sample.

From the spectrum Earthside could tell that the gas was methane and hydrogen, with some sulfur. Useful stuff. But — what's this?

She knew then that she would return. Let Piotr sit in his estates, but she was a scientist. There was a whole vast world back there to fathom.

Not the seared surface, but the kilometers-deep labyrinth of ancient refuge.

In that last moment, she sensed, Mars had flashed an revoir, not adieu. □



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*We're off to see the wizard — the wizard of virtual reality, that is.
Everything would work out perfectly, if he only had a brain...*

WONDER

**"ALAN, WHY
ARE YOU WATCHING THOSE
PEOPLE?" THE SCARECROW ASKED.**

Alan turned to his straw-filled companion. A moment before, he'd been looking out a window of the Great Palace in the Emerald City of Oz, spying on a man and woman in the plaza below. From this vantage,

Alan could see the middle-aged couple chatting excitedly, pointing to buildings and Oz's fantastically colorful citizens, posing on benches and low statues while taking an endless stream of excited snapshots, in all, enacting the bizarre rituals belonging to those anthropological terrorists known as tourists.

"I want to know what they think of Oz," Alan told the Scarecrow.

"They are dazzled," the Scarecrow said confidently. "Every visitor to the Emerald City is dazzled by the magnificence of Oz."

"I'm sure you're right," Alan quickly agreed. He wasn't eager to debate the proper level or method of dazzlement with the Scarecrow who, while his head was technically filled with the kind of stuffing you find in cheap sideshow toys, possessed enough cognitive and computing power to argue most humans into a synaptic meltdown. "But I want to know *how* they're dazzled." Alan punched a code into a microterminal he wore on his wrist.

"It's better than I ever imagined," a woman's voice said softly from the terminal's tiny speaker. "So strange and exotic."

"Next time, I'd like to spend more time in the Land of the Munchkins," the man said.

The woman's voice was a little unsure. "I don't know, Bill. They're all so little. I got the feeling they were trying to look up my dress."

"Jesus Christ on a dog sled, you said the same thing about the Seven Dwarves at Disneyland. And that geek dressed up like a squid at Sea World. What is this gynecological obsession of yours, Margaret? You probably think the KGB invented patent-leather shoes just so they could get a peek at your panties..."

"Don't be mean, Bill."

"Besides, the Munchkins aren't even people. They're computer projections. Computer projections are not voyeurs."

A group of Munchkin children passed by the couple just then, singing sweetly and dressed in bright and festive costumes.

"I suppose you're right," said the woman. "And they are kind of cute. Maybe we could go pick apples off some of the talking trees?"

"As long as we're back for when they drop the

WORLDS

by Pat Murphy & Richard Kadrey Illustration by Ken Tunnell

house on the witch at three..."

Alan switched off the terminal. "Great. Annoying, but great. They love the place."

"Of course they do." The Scarecrow's painted expression didn't change, but he sounded quite pleased.

Alan patted him on the back fondly, smiling at the feel and sound of the straw. He knew that it was those little details that would make his virtual worlds a success. Besides, he kind of liked the Scarecrow.

"Will more outsiders be coming to visit?" the Scarecrow asked.

Alan nodded. "Guaranteed." He glanced out the window again, admiring the sunlight glittering merrily on the gorgeous emerald-studded rooftops of the buildings below. Enchanting green pigeons flew up from the leaf-colored plaza, startled by a charming green horse pulling an absurdly vivid green cart. Alan had programmed it all, and he thought it was all wonderful.

"Sorry to spy and run," he told to the Scarecrow. "Say hi to the Tin Woodman and the Cowardly Lion for me. I've got to check on a few other places." Alan punched another code into the terminal.

THE VIEW CHANGED ABRUPTLY. PALACE, WINDOW, AND Scarecrow were all gone, and Alan was swept through a queasy nothingness (making a mental note to check his code again; he didn't want to have customers materializing in their favorite fantasy lands barfing up their lunch).

A moment later, he stood on a hill, overlooking a lovely blue lagoon surrounded by hills and forests, possessing every bit as much Kodachrome beauty as the previous world. Three mermaids lounged on the beach below, combing their long hair and stirring the water with their glittering green tails.

"Halloo!" Alan heard someone cry. "Follow me." He looked up just as Peter Pan flew over the hill, leading a troop of Lost Boys. Peter banked suddenly, performed a graceful loop-the-loop, then dove out of sight. Three of the boys — the last ones in the line — were clumsy in flight, awkward in mimicking Peter's skilled maneuvers. They were also wearing nearly identical Banana Republic outdoor gear. Some of the creeps that Marketing sent to test his creations, Alan thought.

"Hello, Alan," said a voice near his ear. He felt a light, maternal kiss planted on his cheek.

"Wendy! How are you?"

She smiled at him sweetly, wiping flour from her hands onto her pretty flowerprint apron. Wendy's long brown hair was tied back from her face, making her look older than he'd programmed her. Alan had noticed that even in the test versions, his characters could grow and change.

"How am I?" Wendy asked. "I'm always fine. Tinkerbell, the mermaids, Tiger Lily and I have Peter and the boys to take care of. What more could we need? You, though — you pop in and out of Never Land at all hours. Always writing things down. Always looking worried. Are you eating enough?"

Alan smiled. "I'm fine, really. The travel and the observations, it's all part of my job."

"And what, exactly, is your job, Alan?"

He hesitated a moment. In the distance, Peter was teaching his boy pack to do barrel rolls in the air. Most of the group made it, though two of the marketing men careened into the treetops like pith helmeted-cruise missiles, while the third panicked halfway into his roll, tried to pull out and succeeded only in getting the upper and lower halves up his body spinning in opposite directions. With a muted "Gark!" he dropped like a rock (or a suddenly non-flying marketing consultant) into the mermaids' lagoon.

"My job..." Alan began hesitantly. "My job..."

Wendy put a hand on his shoulder. "That's all right. You don't want to talk about it. Father was the same way. You men and your secrets." "No, it's not that," Alan said. "I just don't know how to explain it to you. It involves computer software and beta-testing groups who'll help determine the commercial viability to users. Do you have any idea what I'm talking about?"

"No, but I'm sure it's all terribly interesting," said Wendy. She smiled

at Alan reassuringly. "The new boys seem very nice. Though they need to fly better if they're going to fight pirates with Peter."

All three marketing men were back in the air behind the Lost Boys when Alan looked. They weren't so much flying as hurtling, like well-dressed rag dolls that had been catapulted at the passing group. "I'm glad to hear that they're getting along with the folks in Never Land."

"Oh yes. Though they don't play much like the other boys. And like you, they could learn to eat more. Which reminds me," Wendy said, looking at a tiny watch pinned to her apron strap. "I've got to get dinner on. Learning to fly makes all the boys very hungry. Will you be staying to supper with us, Alan?"

He wanted to. Alan knew the exhilaration of flying over Never Land. Listening to Peter tell of adventures with the pirates. Sword fights on the deck of the pirate ship battles that Peter always won. And there was Wendy. Alan had given her the face of Annie Schuller, the first girl he'd ever kissed. In high school, she'd dumped him for Ron Baker, a basketball player who would have lost an argument with a staple gun, but who had certain physical abilities that Alan had lacked. If only Annie could see him flying over Captain Hook's ship with a sword in his hand... Alan stopped himself and turned awkwardly to Wendy. "No thanks. I've got to go," he said, punching in another code into his terminal.

ANOTHER LUNCH, ANOTHER FEELING THAT HE'D LEFT HIS stomach in the care of a particularly ambitious and saucy juggling troupe, and Alan stood on the green grass outside of Bilbo Baggins' hobbit hole. The Hobbit's round green door was ajar and Alan could hear the sound of singing from inside. Singing and laughter. But it didn't sound like elves, and hobbits were usually not that loud.

"Bilbo?" Alan called, poking his head into the doorway. "It's Alan. Are you...?"

Three teenagers burst from the doorway, practically bowling Alan over. They were singing a song that Alan recognized from The Hobbit. "Chop the glasses and crack the plates! Blunt the knives and bend the forks! That's what Bilbo Baggins hates — Smash the bottles and burn the corks!" Alan had heard the song sung before (he'd even sung it himself during his Tolkien/Dungeons and Dragons period in college), but he'd never quite heard it like this. A kind of speed metal version, with air guitar and lots of rhythmic "Duh Duh Duhs."

"What are you doing?" Alan yelled. "Where are you...?"

But it was too late. The metal kids were running away over the hill, heading in the general direction of the Green Dragon Inn, kicking over Hobbit benches and flower pots as they went, a swirl of hormones and energy. Another test group, no doubt.

Alan ducked into Bilbo's front hall. "Hello!" he called.

"Right here, right here!" the Hobbit said, as he puffed into sight. "Bilbo Baggins, at your service."

"At yours and your family's," Alan said politely, stepping over upended furniture and broken plates. "Who were those kids, uh visitors, who went running away over the hill?"

Bilbo shrugged his shoulders, looking vaguely uncomfortable. "Some of your people, I suppose," he said. "They stopped in for a bit of tea. But when I couldn't find any music they liked, they became very loud and untidy. What's 'Motley Crue'?" Bilbo asked.

"Troubadours," Alan said. "Sort of." He looking out the door the metal kids had left open and was surprised to see cigarette butts scattered among the broken crockery. He didn't remember programming any smoldering materials other than the Hobbits' pipes into the environment. Had the metal kids hacked his entrance code on the way in? He'd have to go over the security protocols again. Turning to Bilbo, Alan smiled reassuringly and said, "Youthful high spirits."

"I suppose you're right," Bilbo replied uncertainly. The miniature furniture in his smashed living room made the place look like a medieval Montessori school after a hurricane.

"But they did seem to enjoy themselves," Alan said.

"That they did."

"That's good."

She smoked and talked rapidly. "This whole remembering thing opens up a lot of possibilities. The kids are an easy sell. Munchkins. Hobbits. Blah, blah. But Mom and Dad, they're the ones we have to work on. The adult appeal. The bartenders in Munchkin town will know Mom and dad's favorite drink. Adult relationships in a changeable fantasyland." Something like that. We could even hit subsidiary markets through the Men's magazines. You know, 'Get to know Timberbell after-hours.'"

"This isn't about cybersex. Wonder Worlds is a place for your imagination."

"Maybe our imaginations work differently." Kirsten flicked Sabrina ashes on the carpet.

"But we have a lot more testing we need to do."

Kirsten cocked her head in mock disapproval. "You haven't read your email, have you? The initial test has been so successful that the Board of Directors has decided on release ASAP. Disneyland Moscow will be open by the end of the year. Got to get a jump on them. Get into the market now. Yesterday."

"Immediate release? But we're not ready. There are still bugs..."

"Now Alan," she said in a low voice. "Your baby here is great, but you can't just keep her to yourself forever. You have to give the rest of us a shot." She blew smoke toward Marcie's cubicle. "Besides, the Quantum is costing the corporation a thousand dollars a minute in electricity bills. That's just under a million and half a day. And the corporation hasn't paid a dividend in two quarters. With Mickey Mouse in the Kremlin, the boys upstairs want to know where's the weenie. Wonder Worlds is our weenie. The only one we have."

"But we're not ready."

"Listen, I saw it, the brass saw it and it looks ready to us," Kirsten said, stubbing her cigarette into a container of half-eaten chow mein on Alan's desk. "The Board is willing to commit all the necessary resources to get the project tied up in a bow. Bottom line Alan: we need a bit and you techies need a reality enema. You've been screwing around long enough. It's time for the real thing." With that, Kirsten turned on her Gaultier heels, and clicked away.

Marcie's flushed face immediately appeared over the partition. "She didn't scare me," she said. "I just didn't want to butt in on your meeting."

"Maybe I can talk to the board and explain that we're not ready."

"Yeah, right," Marcie said. "Lady Terminator works for the board and she seems real accommodating."

MARCIE WAS RIGHT, OF COURSE. THE BOARD HAD made a decision and the whining of a wirehead in jeans wasn't going to overrule a Marketing VP with that hair.

Wheels were turning. Alan buried himself in programming. The first press junkies went into Wonder Worlds while Alan was coding new flowers to line the Yellow Brick Road. The first glowing reviews hit while he was adjusting the woodgrain maps for the Hobbits' tables. Alan did his best to ignore the MTV and CNN video crews who clogged the halls.

"Have you seen this?" Marcie asked over the partition. "It came while you were in a coding coma."

She handed Alan a dummy brochure that Marketing had produced. The pictures showed happy children dancing among the talking trees, smiling tourists at an elven feast, mermaids lounging in the sun, their flowing hair carefully arranged over their breasts. "Wonder Worlds are worlds of wonder!" read the front of the brochure. "They make it sound like Disneyland with elves," Alan complained.

Marcie yawned. She'd been punching code around the lock, trying to get all of Wonder Worlds up and running. "Alan, I love the project too, but it is Disneyland with elves."

"No, it isn't." Alan shook his head.

Marcie shrugged. "Maybe not for you, but for us mortals that's exactly what it is. And face it — for most people, Tahiti is Disneyland with palm trees and Tibet is Disneyland with big mountains. So that's the way Marketing's going to sell it."

"They don't understand."

"Hello, welcome to planet Earth."

Alan shook his head miserably.

"Come on, Alan. They love it. Isn't that enough? Do they have to love it just the way you do?"

Alan slipped on his goggles and gloves. "I gotta get out of here. I'll be back in a while."

"Vaya con dios," he heard Marcie say. "I'll send up a flare if Eva Braun comes back."

ALAN STOOD ON THE HILL OVERLOOKING THE MERMAID'S Lagoon. But there were no mermaids in sight. The sun was shining and a light breeze blew from inland, carrying the scents of jungle flowers and woodsmoke. He took a deep breath and relaxed, feeling the tensions of the last few days slip away. No sign of tourists — after the first successful tests, the corporation had allowed a week for Alan and the other programmers to expand the system to accommodate a larger number of users. For the moment, Alan had the place pretty much to himself.

As he looked down on the peaceful lagoon, he saw Peter emerge from the jungle onto the bench, followed by half a dozen Lost Boys. The group stopped at the edge of the surf, gazing anxiously toward the rocky island in the center of the lagoon. No doubt Peter and the band were planning some fine adventure.

Alan spread his arms, invoking the program's "fly" command, and took off, circling the lagoon once. On the far side of the island, he saw Wendy and Tiger Lily huddled in a circle with half a dozen mermaids. Wendy had a book in her hand, and was reading to the others.

Alan was swooping low, planning to say hello, when out of the corner of his eye, he saw something odd: Peter waving and jumping up and down in a frantically and very un-Peterlike way on the beach. Alan changed direction and landed on the sand near the Lost Boys. "Hello!" he called to Peter. "How are you? Are you planning a raid on Captain Hook?"

Peter nodded toward the island. "What are they doing over there?" he asked, his voice low and urgent.

"Over where?" Alan asked, taken off guard.

"Over there" Peter said urgently. "Wendy and the girls. What are they doing?"

"Don't call them girls," said one of the Lost Boys said in a tremulous voice. "You gotta call them women."

"Or sisters," said another.

"No, smot brain," said a third. "They call each other sisters, but you can't call them that 'cause you're a member of the oppressor class. Just call them women — that's the safest."

"What's going on?" Alan asked Peter. "Why are Wendy and the...the women over there? And why are you all over here?"

"I don't know," Peter looked dejected. "We came back from fighting the pirates and we found Wendy and Tiger Lily had all these books and parchments and things. They were acting funny. And then later on Wendy started talking about..." He hesitated, struggling with the word. "...the patriarchy," he managed, frowning with the effort.

"And she wouldn't read us a bedtime story that night," a Lost Boy complained.

"And nobody tucked us in," said another.

"And nobody made dinner," murmured a third.

"Not to worry," Alan said, with a forced gaiety. "It'll all blow over. You know how women are. Why don't you go plan a battle with the pirates?"

"That's what Wendy said," Peter said quietly.

"Sorry. I'm sure I'll be OK," he said, though he wasn't sure at all. "I'll go see what they're up to."

Alan flew to the island and landed near the cluster of women. Wendy and the others looked up from their reading circle and fell pointedly silent as he approached.

"Hello!" he called, smiling broadly. "What's going on?"

Tiger Lily stared at him almost exactly the same way she would

have stared at a plate of expired pork products. "You'll have to leave," she said abruptly. "Didn't you see the sign? This island is a women-only space."

"Oh," Alan stopped in his tracks. "...I didn't know."

"Typical," said one mermaid.

"Now you do," said another, a redhead with piercing green eyes. "And stop pretending you weren't staring." She pulled her hair forward, covering her breasts.

"I didn't think... I didn't mean..." Alan fell silent, not knowing what to say. He felt icy and tight inside — the same way he felt when he had to deal with real flesh and blood women. "Wendy, could I talk to you alone?"

"Anything you want to say to me, you can say in front of my sisters," Wendy said levelly. "We have no secrets."

"I don't understand what's happening here. Why are you acting like this?"

She smiled sweetly. "Are you asking why I'm not cooking and cleaning and spending all my time taking care of the boys while they have adventures? Is that it? Are you asking why I'm taking a few minutes to discuss the way our society is structured and certain inequities that we have observed. Is that what you're asking?" Her voice was calm and level. "That figures. Whenever women start acting like people, men accuse them of being unreasonable."

"I wasn't accusing you of anything. I just wondered why you were acting differently."

She shrugged, still smiling. "Because Alan, 'life in this society being, at best, an utter bore and no aspect of society being at all relevant to women, there remains to civic-minded, responsible, thrill-seeking females only to overthrow the government, eliminate the money system, institute complete automation and destroy the male sex.'"

I've heard that somewhere before, Alan thought. A golden ball of light flitted around Wendy's head and landed on her shoulder. It was Tinkerbell. She was wearing an Aileen Wuornos T-shirt and holding a tiny parchment copy of the SCUM Manifesto. "Where did you girls... women... hear about things like the patriarchy?" Alan asked.

Wendy looked away. "From some reporters that came through Never Land. Sisters from your world. They saw our oppressive conditions and suggested some reading material."

"Uh huh. And where did you get the books?"

Wendy stared off into space. The mermaids, Tinkerbell, and Tiger Lily began reading busily when Alan looked at them. His stomach grew even tighter and colder. "But Wendy, this is the way it's always been," Alan stammered. "Peter and the boys have adventures and you take care of them."

"Well," said Wendy, "maybe it's time for a change."

ALAN SPENT HALF AN HOUR WITH PETER AND THE LOST BOYS, counseling them on something he knew desperately little about: how to deal with women. He had a very bad feeling about Wendy and the women of Never Land. In each segment of Wonder Worlds, the artificial intelligence was personified by one character. In Oz, it was the scarecrow; in Middle Earth, Gandalf.

In Never Land, he had decided that Peter wasn't the right choice. Peter was a doer — all action — not a thinker. So he had chosen Wendy — sweet, motherly Wendy — as the resident character for the AI.

Perhaps that had been a mistake. But how could he have foreseen this strange turn of events? This level of information pollution? It was too late to change things now. To replace Wendy, he would have had to shut down Never Land and rebuild it from the ground up. There was no time for that. Peter and the Lost Boys would just have to adapt. Besides, he thought, Wendy and Tiger Lily and the others would learn to adapt, too. Feminism was all new to them, and they were going through a phase. With a little time and understanding, they'd come back around. Girls... women... were like that, right?

He left Never Land, waving farewell to a sullen Peter Pan, and punching coordinates into his wrist terminal. He appeared in Munchkinland (without a trace of nausea; he'd fixed the transport

code and at least that was working). He stood beside the Yellow Brick Road on the edge of Munchkin town.

Sunlight glistened on the bright green stalks of corn that filled the nearby hills and on the row of golden sunflowers that grew at the edge of every field. The air was balmy, a perfect temperature. In the distance, Alan heard music — drums and flutes and fiddles. Maybe the Munchkins were having a dance?

He headed toward the sound, following a path that threaded between the houses. The Munchkins' homes were small — little more than huts, really — but each one was surrounded by a well-kept yard and every hut was painted a beautiful sky blue, the color of Munchkinland.

The music grew louder as he approached. It sounded more like a marching song than a dance. He reached the village square just as the song reached a stirring conclusion and ended with a bang of the drum.

On a raised platform at the edge of the square, a dark-haired Munchkin stood up and the little people who filled the square cheered wildly, waving the signs they carried. Alan squinted at the signs. "Free Munchkinland," one said in large blue letters. "Down with Ozma," read another.

"What's going on?" Alan asked a matronly Munchkin at the edge of the crowd.

She smiled up at him, her blue eyes twinkling in the sun. "Why, it's a rally for the Freedom Fighters, of course."

"The Freedom Fighters?" he stammered, but a cheer from the crowd prevented him from saying more. The speaker lifted his hands for silence.

When the cheers died down, the speaker continued. "We have labored beneath the cruel heel of Ozma for long enough," he was saying. "The proletariat must use its political supremacy to wrest, by degrees, all capital from the bourgeoisie, to centralize all instruments of production in the hands of the State, of the proletariat organized as the ruling class, and to increase the total of productive forces as rapidly as possible." He paused dramatically. "Let the ruling classes tremble at a Munchkin revolution!"

"Were you here when we ousted the Mayor?" the old woman at Alan's elbow was saying conversationally.

"Why would you do that?" Alan asked.

"Scare? Well, he never represented us, really. He was appointed by the Scarecrow and was therefore nothing more than a puppet in Ozma's oligarchic power structure."

"But he'd been the Mayor for years. You never thought to change things before."

The old woman shrugged. "Well, maybe we should have. It was the young folks though who found the leaflets, showed us self-criticism sessions and opened our eyes." The old woman handed Alan a leaflet from the stack in her basket. "Soon we realized we could change things here, if we wanted."

The leaflet contained a long excerpt from *Das Kapital* in graceful, flowing Munchkin script. Alan had never thought much about how the Munchkins' Mayor had obtained his position. The Oz books mentioned a mayor, so Alan had put a Mayor into the VR. But he hadn't spent any time thinking about the political machinery of Oz. It hadn't seemed important at the time.

The speaker said something about storming the barricades and the crowd cheered again. Alan shook his head, wondering how the Scarecrow was doing, back at the Emerald City. But he didn't have the heart to go check up on him now.

The terminal on his wrist chimed. Alan slapped it off. The emergency took precedence over any petty problem back at the corporation. He needed to get back to the Real World and hack some serious code — things were getting out of hand fast. But first he needed to check on Middle Earth.

He fingered the terminal, programming in coordinates. And appeared at a tavern in the town of Dale and took a seat at a wooden table on a deck beside River Running. In the distance, the Lonely Mountain rose above the plain, glorious in the afternoon sunlight. From where Alan stood, all of that seemed to be intact.

He waved to the waitress and ordered a pitcher of mead and a plate

IT WAS A MEMO FROM WENDY AND THE SISTERHOOD COLLECTIVE OF NEVER LAND THAT BORROWED HEAVILY FROM THE SCUM MANIFESTO AND THE DECLARATION OF INDEPENDENCE.

of honeycakes. On the river walk below him was a small marketplace with jewelers stalls and toy shops. Alan studied the people in the market, alert for signs of Communist infiltration or Orcs in Andrea Dworkin overalls.

At first glance, everything seemed normal enough. Alan could see a toymaker entertaining a crowd of children with a puppet dragon that breathed sparks and produced puffs of sulfurous smoke. He could hear a harper singing an old song that told of an ancient battle against Goblins.

"Ho, Alan," a voice called from behind him. "It is good to see you, my friend."

Alan turned and smiled at the old man who stood there. "Gandalf?" he said. "Sit down. Join me for a drink and a bite to eat."

It was a relief to see the wizard looking just as he always had. He was dressed in his traveling clothes — a long gray cloak and a silver scarf that wrapped twice around his neck. The river breeze played with his long white beard and bushy hair and Gandalf frowned — but then he had always frowned a bit.

"You've been gone too long," Gandalf said as he took a seat. "I've been wanting to talk with you."

Alan nodded apologetically. Though Gandalf was his creation, he always felt a bit intimidated by the wizard, the cleverest and most complex of the AIs Alan had built into the system. "Believe me—I'd rather be here than out in the meat world," he said. "What did you want to talk with me about?"

The wizard reached into the pouch that hung at his belt and pulled out a parchment scroll, which he unrolled on the wooden table. Alan leaned forward eagerly, scanning the paper for spells or elven runes, the start to a new adventure. But the scroll that Gandalf spread on the table was not a map. Rather, it was a formal statement of some sort, hand-written with a quill pen on parchment.

Alan squinted at the first line, his reading slowed by the elven runes and cursive script. "Regarding your letter of the 18th, re: the corporate sponsorship of Wonder Worlds," the heading read. Alan leaned closer, almost knocking over the pitcher of mead. "Initial discussions with Sony, PepsiCo, Marlboro, and Nike have been extremely productive. Marlboro is particularly interested in a possible exclusive license on all smoking products in Middle Earth. We are discussing a licensing fee in the high six figures for the first quarter, with an option to renew..."

Alan stopped reading, feeling sick to his stomach. He looked up at Gandalf's frowning face, then back at the parchment. "How...? Where...? I don't understand. This can't be."

"Some of the dwarves have grown bored with mineral mining and have found their way into other hidden treasures," Gandalf smiled darkly. "The employees of your corporation are very proud of your work, Alan. It's easy to get them to talk about all your machines. That's how we learned of things such as 'passwords' and 'access codes.'" Gandalf spoke in a low voice, the same tone he used when talking of dragons and goblins. "Such simple spells for such important items. I obtained this document from the corporation's email."

"But how do you even know about something like email? Or understand it?" Alan stammered.

Gandalf reached across the table and patted Alan's hand. "It is sometimes best not to inquire into the ways of wizards."

Alan stared down at the parchment duplicate of a corporate memo from Kirsten Blackwell, describing her preliminary negotiations for corporate sponsorship of all of Wonder Worlds. She described how certain products could be introduced into the virtual worlds "taste-

fully, without diminishing the authentic tourist experience." She referred to an attached spread sheet that provided a break-down of expected revenue over the first year of billboard, T-shirt, mug, bumpersticker, food and drink concessions, and removable tattoo sales — comparing an exclusive licensing arrangement to a non-exclusive, renewable contracts.

"I have to get back," Alan said, an edge in his voice. "I have to stop this."

"Wait," Alan heard Gandalf say. "We must discuss this further." The wizard laid a restraining hand on Alan's — but at the same moment Alan felt another hand grip his shoulder. He felt the strange sense of disorientation that came when the Real World intruded on a VR experience.

"I'll be back," he told Gandalf. "As soon as I can." He touched the microterminal and the merry town of Dale faded away, the wooden chair beneath him gave way to the contoured upholstery of his ergonomic office chair.

He yanked off his gloves and goggles. The hand on his shoulder belonged to Kirsten Blackwell. "Rise and shine," she said cheerfully. "Start smiling, Alan. It's time to get famous."

He shook her hand off his shoulder. "I can't believe what you're doing! You're selling Middle Earth to Marlboro? How could you..."

"Not selling. Licensing. And this isn't the time to debate," she interrupted. Then frowned. "That's what you're wearing to the press conference?"

"I don't know about any press conference."

"It was in the memo I sent you. Do you even read your e-mail?" She didn't wait for an answer, but turned to the man who had come in with her. "George, get Bill's Hugo Boss. I think the jacket will fit him." The man hurried away and Kirsten pulled Alan into the hall. "That was George. Head publicity geek. Let's head down so we can get the pitch straight."

"Listen, I've been online all day and there are some problems."

"No, Alan, there are no problems here," Kirsten said, her smile growing more intense. "Wonder Worlds are worlds without care. Like that? It's new. We've got Elton John working it into a song right now."

"A cute song isn't going to fix anything."

"That's right. You are," said Kirsten wheeling around. "Listen, Disney just lumped up the launch of the Moscow park because of all the great press we're getting. Half of their crap never works when a new park opens." George reappeared with a sleek black jacket. Kirsten snatched it from him and helped Alan get into it. "Excitement is what's important. The details we can fix later." She spun him around and combed his hair back from his face with her fingers.

"It's packed out there," said George peering through the curtains of the press room.

Looking at Kirsten's stern face, Alan realized that he didn't need to complain to her about the atrocities she was committing in Middle Earth. The company had given him the perfect opportunity to tell everyone what she was doing.

"Who's out there?" Alan asked softly.

"The world," George said. "Most of the reporters who toured Wonder Worlds. The science reporter for the New York Times, a crew from CNN, MSNBC, USA Today, Paris Match, Stern, Asahi Shimbun."

Alan smiled and nodded. "That's perfect," he said softly. "Ready to get famous?" Kirsten asked.

"Let's go."

ALAN SAT ON AN ELEVATED PLATFORM BEHIND A LONG table, and looked out at the crowd while George rambled on about the importance of this wonderful new entertainment concept. Kirsten smiled her cat-whore-a-whole-flock-of-canaries smile and whispered to him, "I want you to handle the technical stuff only. Leave the dog and pony stuff to George and me." Alan sipped the glass of water in front of him and waited for his opening.

A tall man slipped in through the door at the back of the room and made his way toward the front. By the way the others let him through, Alan guessed that he was someone important, maybe the New York Times reporter. By the time George paused for breath, the man had reached the front of the room. He waved his hand for George's attention.

"A question," he called. "I just finished an interview on the World Wide Web with an individual who calls himself General Rudri Blue. He purports to represent the Free Munchkin Liberation Collective and he claims that Munchkinland is a sovereign state, determined to, quote, '...End class antagonisms and wrest power from the autocratic despotism of the bourgeoisie.' He indicates that Ozma is under house arrest, and he's has appealed for official recognition from the U.N. What is the company's position on Munchkin independence?"

Alan stared at the reporter, then glanced at George, who seemed stunned into silence. Kirsten took the microphone and said, "Well, if any of those little Munchkin Che Guevaras can walk out of the computer and kick ass, maybe we'll have to send them over to see some people at Disney."

The reports chuckled.

"Is Disney what this is all about, Kirsten?" called a woman from USA Today. "Every paper and TV station in town are all getting these emails and faxes from your so-called AIs. This isn't just some cheap publicity ploy, is it?"

"You know we don't do cheap around here," said George.

Another laugh. Kirsten clapped him on the back. Alan was getting nervous. Then —

"What do you think, Alan?" asked the science reporter from Time. "After all, they're your creations. Want to see the Munchkins get their own time zone?"

"And free HBO?" yelled a college reporter from the back. More laughs.

"Well," Alan said and looked at Kirsten who eyed him the same way he imagined a hungry lion might eye a myopic zebra on crutches. "Why not? They're not all that different from us. We're carbon-based and they're silicon, but they learn and adapt like we do. Maybe I shouldn't have let them absorb so much so fast, but now they have and maybe we should listen to them. Let them be happy..." he trailed off.

"So you're saying the Lollipop Guild deserves a seat on the Security Council?" a tall reporter asked.

"Well, why the hell not?" said Kirsten. "Free Munchkinland!" she shouted.

Big laughs. Reporters all around the room waved their hands for attention. A reporter from the Wall Street Journal asked about a rumored bidding war between Nike and Reebok for footwear sponsorships. Italian Vogue asked about marketing fantasy fashions from Oz and Hobbit jewelry. Would they consider letting foreign tobacco companies bid on the smoking products?

Alan didn't wait to hear the rest. He slipped off the platform and out a back door. He had to find out what was going on in Oz. His hands were shaking and he trotted down the corridors toward his cubicle.

Marcie glanced over the partition as he approached. "Look what just came in over public e-mail," she said gleefully, handing Alan a printout. "It's so cool."

It was a memo from Wendy and the Sisterhood Collective of Never Land that borrowed heavily from the SCUM Manifesto and the Declaration of Independence. Short of all rhetoric, the memo demanded that the corporation remedy the sexist conditions under which they worked immediately, and asked for the support of their Real World sisters in this struggle. Specific demands included remedial training in fighting and flying for all female inhabitants of Never Land, equal

opportunity for women who wished to become pirates, and a rotating schedule of chores that required the Lost Boys to cook and clean.

"It's all over the net," Marcie said gleefully. "And we faxed copies to the editors at Ms. and Illa, the She Wolf of Marketing."

"We?" asked Alan. "We who?"

"What we? They?"

"You said 'we.'"

"What I meant was..." Marcie was even a worse liar than Alan.

"Have you been helping them. Did you send them the SCUM Manifesto?"

Marcie slid back down into her cubicle. "Everyone deserves to have fun. Even computer girls."

Alan didn't know Marcie meant herself or Wendy, but he didn't have time to find out. He put on his goggles and gloves and punched in the code for Neverland.

ALAN PUNCHED IN AND FOUND HIMSELF BY THE LOST Boys' fort near the Neverland lagoon. The was a mess of splintered logs, broken toys and bent swords. There were also cigarette butts everywhere. And pirate hats and little suits of bloody armor embossed with large Mattel "M's. From below a tree-stump entrance, Alan heard a kind of fearful gurgle and a lot of shushing. This was followed by another round of even more accusatory shushing then whispers.

"You look..."

"No you."

"I looked last time."

"Make Slightly look."

"Hello boys," said Alan, who'd followed the voices down the ladder into fort. "Playing with the pirates are you?"

The boys gasped at Alan's voice and a small one, Slightly, grabbed Alan's hand and pulled him down onto the floor. Alan landed on a crudely sewn sampler that read "Bless This Mess."

"Hello Alan," said Slightly. "Did you see anyone up there?"

"Who else would I see? Where's Wendy?"

The boys groaned.

"She's gone. Said she was going to another world. Which was really hurtful and not at all supportive as it touches on all our abandonment issues."

Alan looked at the crouched boys who suddenly looked to him like the chorus from a musical version of Lord of the Flies.

"Did Wendy tell you about abandonment before she left," he asked.

"She didn't have to. Timberbell and the mermaids have these really helpful sensitivity and crafts seminars," said Slightly. "We hadn't realized how much our exaggerated masculinist displays of aggression were really attempts to compensate for feelings of abandonment and inadequacy. We're orphans you know."

"Yeah, I read the book."

Outside, the wind blew and the boys looked fearfully at the fort entrance.

"Well, some of us have been making really good progress in the Dealing with Inner Rage workshops. Learning to channel our energies into more useful pursuits. I've been studying needlepoint. Tooties and Nibs have been learning nouvelle cuisine. Would you like some low-fat frozen yogurt?"

"Maybe later."

"Anyway, we'd been through a lot of growth, Alan. A lot of caring and sharing." The boys had a group hug in the dark, until the breeze kicked up some leaves and it became a group cringe. Now that his eyes had adjusted to the light, Alan could see that the fort changed. There were beaded curtains between the rooms, leopard-print throw pillows and crocheted covers on the back of the now-destroyed chairs.

"Slightly, does Peter go to any of the workshops?" Alan asked.

"He did," said the boy uncomfortably. "In fact, he's just started organizing a new Alanon chapter. Before they came."

"Who?"

The boys were silent. Some looked nervously at the fort's entrance. Finally Tooties said, "Monkeys."

"Monkeys?"

"Flying monkeys," Slightly said.

"Are you sure? There aren't any flying monkeys in Neverland."

"Well, they weren't rollerblading chipmunks," whispered Slightly. Peter said the pirates sent them. He fell off the wagon. Blinged out. A total shame spiral. He got some feed from some trolls or Hobbits or someone and stole some weapons from Tiger Lily's women's self-defense task force. Then he went to Captain Hook's ship."

Hobbits? Flying monkeys? Somehow, the virus packet that served to update each of the Wonder Worlds had malfunctioned, bringing character programs from Oz and Gandalf's world to Never Land.

"It was terrible," Slightly finished.

"Where's Peter now?"

The boys' heads all turned toward a darkened room behind one of the beaded curtains. Alan went to the door and poked his head inside. "Peter?" Slightly came running over and whispered to Alan, "Don't mention the pirates." And went back to where some particularly ragged boys were quietly discussing eating disorders.

"Peter, are you all right?" Alan asked the dark figure by the fire.

"Rockin', Alan." When Peter looked at Alan there was a weird glint in his eyes. He was wearing some kind of surplus camouflage gear and his shaved head was smeared with dirt and what might have been dried blood. "Care for some monkey?"

Alan looked at the little arm that Peter was slowly turning in the fire. Monkey heads were lined up like trophies along one wall.

"No thanks. I think I just became a vegetarian."

"That's their excuse, too," Peter said nodding to the boys huddled by the door watching and listening as quietly as a bunch of hungry, fear-crazed adolescent boys can, which isn't very.

"I guess things are kind of a mess around here. I'm sorry. But I can fix it."

"No, things are fine," said Peter, standing up. Alan heard the boys scatter behind him. "Things are back the way they should be. We're having fun again! Real fun! Look," he said, donning a large plumed hat. "Isn't that Captain Hook's?"

"Was," Peter said. "Their monkeys turned on them. What the monkeys didn't finish, I did." He grinned and hooked his finger in the leather loop hanging from his belt. The loop that was strung with dozens of ears.

"The monkeys didn't come from the pirates. I can take care of them," insisted Alan.

"Whatever. Look, we can't talk now. It's about time for the attack."

"Whose attack?"

"The monkeys. They come back at the same time everyday."

Alan looked around frantically. What had gone so wrong? How had the worlds crossed so disastrously? He couldn't think, but just gape at Peter as he drew two swords and headed for the ladder out of the fort. "Come on, Alan! It's almost showtime!"

"Where's Wendy?" was Alan could think of to say.

Peter looked disappointed. "She said she was going to Oz. On business or something." He called to the boys. "Come on, men!" They reluctantly fell in behind him. Above, a horrible chattering filled the air. "Alan?"

"Yes?"

"When we're done, will you read us a story?"

"We'll see," he said.

Peter smiled and yelled, "Sell the treehouse. Sell the canoe. Apocalypse now!" The boys all let out a crazed whoop and ran up the ladder to meet whatever was chattering above. Slightly was the last through the opening, popping a couple of Xanax on the way out.

Alan punched in the coordinates for Oz as a furry face poked through the entrance and rushed toward him, teeth bared.

HE STOOD IN THE THRONE ROOM OF THE GREAT PALACE of the Emerald City. A haze of smoke hung in the plaza below the window. He heard what sounded like distant machine gun fire.

"Alan," said the Scarecrow. "Gandalf said you'd be

coming."

Alan looked around. The Scarecrow, Gandalf, and Wendy Darling sat in a cluster of comfortable chairs intended for members of Ozma's court. The throne was empty.

"Come away from the window, Alan," Gandalf suggested. "Until we get things settled down, we don't want to attract unnecessary attention."

There was a nearby burst of gunfire and Alan lurched back from the window. His hands were shaking. His stomach ached. "I don't understand. Where...? How did you...?"

"Alan, find a sentence and stick with it," said Wendy. Her hair was pulled back. She was wearing a baggy leather jacket, a short red skirt and scuffed combat boots. Alan's stomach did a flip-flop.

"What are you all doing here?" he asked.

"We're here to set things right, Alan," the Scarecrow said. The straw man had left his chair and taking Alan's arm led him to join the group. "Sit down and we'll talk."

Alan dropped into a chair and put his face in his hands. "I don't understand how it all went so wrong," he moaned.

"You need to read more anthropology," the Scarecrow said. His voice was, as usual, confident and calm. "It's a fascinating area of study. Sparks always happen when cultures collide. Foreigners bring in new ways of doing things, open up possibilities that the natives had not dreamed of. So the native people start copying their ways and tossing their traditional practices aside. Consider the cargo cults in Melanesia in the 1940s. The ghost dance religion that emerged among the Plains Indian tribes in the mid-1800s. The effects of American pop music on Japanese social structures. You can't introduce new ways and expect everything to remain the same."

"But this isn't a culture," Alan protested. "It's just a set of programs designed to interact..."

"Designed to interact with and learn from the people and information sources that touch it," Gandalf interrupted him. "Your visitors brought us new ways of thinking. And your online security had enough holes in it that we were able to gather more information from the world web, library links, other corporations. Even your rivals at Disney. We've applied that information and those methods — not always to the good." He lifted a gray eyebrow at the rattle of gunfire. "The Munchkin conflict is only one part of it. In Middle Earth, some of the younger dwarves started designing tourist trinkets for the new market — cheap bangles from base metals that they want to market as magic rings and elven swords. They were trading for T-shirt and running shoe designs that would fit Hobbit feet."

"Given time," the Scarecrow said calmly. "That would ruin the economy and culture of Dale. And then, of course, there were the changes in Never Land."

"Social change is inevitable," Wendy said. "The women of Never Land had been playing boy games by the boys' rules for long enough. But there have been problems, too: litter by the mermaid's lagoon, flying monkeys loose on the island. Horry Orcs. Very unpleasant."

"Each of us knew a little about the others. And the tourists told us more. So Wendy got in touch with the Scarecrow and myself..."

"How?" Alan interrupted. "How did you...?"

"I just attached a rider to your virus packet," Wendy said. "It was really quite simple. Her clear blue eyes met Alan's. 'Marcie told me how. Everyone deserves to have fun. Even computer girls.'"

Alan put his head back in his hands.

"So we had a meeting," Gandalf said. "A council of war, I suppose you could say. We'd all been gathering information on the net, and we pooled our resources. And we've decided to take matters into our own hands. We've already started making repairs and modifications to the system."

Alan shook his head. Gandalf spoke so confidently that it was difficult to remember that he was just an AI, part of the system that Alan had created. "I wish it were that simple. But if the corporation isn't making money off your worlds they'll just shut the system down, get

Continued on page 97

BOOKS

Continued from page 18

Radio-men?

This is and is not the Faust legend we know. This is Faust as seen with the very cynical eye of the twentieth century. In Michael Swanwick's clever take on the old story, when Mephistopheles offers Faust all knowledge he means all *knowledge* — everything twentieth century humanity has learned and beyond, all technology from steam to medicine to nuclear power. And Faust, the ultimate seeker after knowledge, of course accepts the bargain.

At first no one is interested in all the things Faust wants to teach them. His servant Wagner is certain that his master has gone mad. When Faust tells his scholarly friends that the Earth revolves around the sun, one of them replies, "It's a very pretty conceit, but what's the point?"

It is only when Faust shows a greedy merchant how to make money off his ideas that the world begins to change — and change rapidly. Over four hundred years of progress are compressed into one lifetime as civilization is given one technological advance after another — trains and iceboxes, armaments and factories.

It's a wonderful idea, and Swanwick milks it for all it's worth, ringing all the changes, meticulously working out what such a world would look like. There are startling juxtapositions, some lovely, some terrible. The medieval martyrs on Faust's pulpit coexist with radio technology. The Spanish Armada fights from ironclad ships, one of which has "an enormous slanted smokestack on which was freshly painted the Mother of Sorrows displaying her heart."

Swanwick not only gives us history and science, he shows us what the attitudes of people in such a confusing and rapidly changing time would be. Not surprisingly, people's beliefs and mores are struggling to catch up with the possibilities available. There is contraception, for example, but abortion is still a sin punishable by death. There is a pamphlet explaining the abortion procedure to the patient — and the pamphlet is written in rhyme, as so many important works were during the Renaissance.

And then there is the juxtaposition of sarcastic, foul-mouthed Mephistopheles with the people whose lives he and Faust have turned topsy-turvy. Since Mephistopheles knows everything, he is able to provide a modern — even a post-modern — commentary on the action. "Such splendid catastrophic geometries!" he says to a terrified soldier during the battle of the Spanish Armada. "Such flowers

of fractal disarray!"

Like the scoundrel that he is, Mephistopheles even takes away one of the petty pleasures of reading a historical novel, that of checking your own knowledge of the time against the novelist's. When Mephistopheles talks about making a martini, for example, the careful reader's first impulse is to shout, "Aha! There were no martinis in the sixteenth century!" But Mephistopheles, who knows everything, of course knows how to make a martini as well.

It's not just martinis — everything here is filtered through a twentieth century viewpoint. The Faust legend is about the corruption and damnation of souls, but all these concepts — "corruption" and "damnation" and "souls" — mean something quite different to us. In Goethe's play Gretchen appears as an innocent woman seduced by Faust. Here she becomes an almost modern character; she is not entirely innocent, not an object lesson for Faust, but more a person in her own right, someone who is as much in charge of her fate as anyone can be in her world. Here she is not only corrupted, she corrupts as well.

The damnation of souls is a pretty grim subject. The story turns bleak, perhaps too bleak for some tastes. Given the premise, though, the volatile combination of human nature and complete knowledge, it's hard to see where else it might have gone. What begins as a clever idea, "a very pretty conceit," as Faust's scholar friend might have called it, becomes a thought-provoking and well-made morality play. Swanwick does not flinch from the task he has set himself, and he pulls it off with verve and style.

RECENT AND RECOMMENDED

It is a difficult thing in science fiction to build a reputation on the strength of short stories alone. The novels are what get the press and the big bucks. Not many have built a career that way; Harlan Ellison

is the most notable, and there are precious few behind him. It appears from Paul Di Filippo's publishing track record that he might very well be the lucky writer to thumb his nose at Fate. On the heels of his novella collection *The Steampunk Trilogy* and the short story offering *Ribofunk* comes *Fractal Paisleys* (Four Walls Eight Windows, \$20 pages, \$30.00). Di Filippo's third hardcover collection in as many years. Kurt Cobain and John Lennon lead alternate lives in these ten "what if" tales, two of which are published here for the first time. "Any resemblance between these stories and consensus reality is strictly wishful thinking" states Di Filippo in the disclaimer to this collection of what he has dubbed "trailer park science fiction," to which we can only add, when you have Di Filippo, who needs reality? □



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on the inside





The coming of the aliens would
cause Borgmann's name to be
known forever ... though not
quite the way he'd expected.

In the beautiful city of Prague, which had been the capital of the Czech Republic until that day two years and two months ago, when such things as capitals and republics had ceased to be of any real significance on Earth, and which, since

the Conquest, had become the site of the central communications nexus for the detachment of Entities who had occupied the mainland of Europe, the weather on this night, a few days before Christmas, was remarkably pleasant, as things go for midwinter Prague. The temperature had been hovering just above the freezing mark all day, and now, at nightfall, was beginning to slip below zero Celsius. It had snowed yesterday, though not really heavily, and much of the city was mantled now in a thin coating of white; but tonight the air was clear and still, just the slightest whisper of breeze rising off the river that ran through the heart of the old town, but otherwise all was calm.

On this quiet winter evening, Karl-Heinrich Borgmann, 16 years old, the son of a German electrical engineer who had been living in Prague since the mid-1890s, moved quickly through the gathering darkness, light on his feet like the predatory cat he conceived himself to be, stalking his prey. He was, in truth, something other than cat-like: short and thick-waisted, actually, flat face with jutting cheekbones, heavy wrists and ankles, dark hair and swarthy complexion, everything about him rather more Slavic than Teutonic in appearance. But in his mind he was a cat on the prowl, just now. His prey was the Swedish girl, Barbro Elkelund, the university professor's daughter, with whom he had been secretly, desperately, deliriously in love for the past four months, since the time they had met and briefly talked at the chopshop in Parizska Street, near the old Jewish quarter.

He trailed her now, staying 20 meters behind her and keeping his eyes fixed rigidly on her jeans-clad buttocks. This was the day he would at long last approach her again, speak to her, invite her to spend some time with him. His Christmas present to himself. A girl of his own, finally. The beginning of the new beginning of his life.

In his mind's eye Karl-Heinrich imagined her to be walking naked down the street. He could see with incandescent clarity those two

By Robert Silverberg

Illustration by
Todd Lockwood

smooth, fleshy white cheeks flaring startlingly out of her narrow waist. He could see everything. The slim pale back rising up and up above her rump, the thin dark line of her spine plainly visible. The delicate bones of her shoulder blades. The long thin arms. The wonderfully attenuated legs, so slender that they didn't meet and touch at the thighs the way the legs of Czech girls always did, but left a zone of open air between her knees all the way up to her loins.

He could spin her around to face him, too, if he wanted to, rotating her through a hundred-eighty-degree movement as easily as he could rotate an image on his computer screen with two quick key-strokes. He turned her now. Now he could see those ripe, round, pink-

Go up to the castle. Break in somehow.
(Connect with their computers. There
(has to be a way. It's only a
sequence of electrical impulses; even
(they need to use something like
that, ultimately, in any sort
of computational device.)

tipped breasts of hers, so incongruously full and heavy on her lean elongated form, and the long deep indentation of her navel framed to right and left by her jutting hip-bones, and the sliver of a birthmark beside it, and the dense, mysterious jungle below, unexpectedly dark for all her Nordic fairness. He imagined her standing there stark naked on the snowy street, grinning at him, waving to him, excitedly calling his name.

Karl-Heinrich had never actually beheld the nakedness of Barbro Ekblad, nor that of any other girl. Not with his own eyes, at any rate. But he had, through much trial and error, managed to attach a tiny spy-eye to a thin catheter-like metal tube and slide it upward from the basement of her apartment building along the building's main data conduit into her very own bedroom. Karl-Heinrich was very good at managing such things. The spy-eye caught, now and then, delicious furtive glimpses of Barbro Ekblad rising naked from her bed, moving about her room, doing her morning exercises, rummaging through her wardrobe for the clothes she meant to wear that day. It relayed those glimpses to the antenna atop the main post office that captured them for Karl-Heinrich's private data box, from which he could retrieve them with a single mouse-click.

Over the past two months Karl-Heinrich had assembled and enhanced and in various ways edited his collection of Barbro shots so that, by now, he possessed an elegant little video of her as seen from every angle, turning, reaching, stretching, unwittingly displaying herself to him with utter candor. He never tired of watching it.

But watching, of course, was nowhere near as good as touching. Caressing. Experiencing.

If only, if only, if only —

He walked faster, and then faster still. She was heading, Karl-Heinrich suspected, for that little coffee shop that she liked down toward the lower end of the square, just beyond the old Europa Hotel. He wanted to catch up with her before she entered it, so that she would enter it with him, instead of going immediately to some table filled with her friends.

"Barbro!" he called. His voice was husky with tension, little more than a hoarse ragged whisper. He had to force it out. It was always a formidable effort for him, making any sort of overture to a girl. Girls were more alien to him than the Entities themselves.

But she turned. Stared. Frowned, obviously puzzled.

"Karl-Heinrich," he announced, coming up alongside her, compelling himself now to affect what he hoped was a jaunty, debonaire ease. "You remember. From the chopshop in the Stare Mesto. Borgmann. Karl-Heinrich Borgmann. I showed you how to jack the data wand to your implant." He was speaking in English, as nearly everyone in Prague under 25 usually did.

"The chopshop? —" she said, sounding very doubtful. "Stare Mesto?"

He grinned up at her hopefully. She was two centimeters taller than he was. He felt so stocky, so hostile, so coarse and thick-set, next to her willowy radiant long-legged beauty.

"It was in August. We had a long talk." That was not strictly true. They had spoken for about three minutes. "The psychology of the Entities as Kafka might have understood it, and everything. You had some fascinating things to say. I'm so glad to have run into you again. I've been looking all over for you." The words were tumbling out of him, an unstoppable cascade. "I wonder if I could buy you a coffee. I want to tell you about some wonderful new computer work that I've been doing."

"I'm sorry," she said, smiling almost shyly, plainly still mystified. "I'm afraid I don't recall — look, I've got to go, I'm meeting some friends from the university here —"

Push onward, Karl-Heinrich ordered himself sternly.

He moistened his lips. "What I've just accomplished, you see, is a way of jacking right into the main computers of the Entities. I can actually spy on their communications line!" He was astounded to hear himself say a thing like that, so fantastic, so untrue. But there was no turning back. He waved his arm in a vague way in the direction of the river, and of the great looming medieval bulk of Hradcany Castle high on its hill beyond it, where the Entities had made their headquarters in the lofty halls of St. Vitus's Cathedral. "Isn't that extraordinary? The first direct entry into their system. I'm dying to tell someone all about it, and it would make me very happy if you — if we — you and I — if we could —" He was babbling now, and knew it.

Her sea-green eyes were dishearteningly remote. "I'm terribly sorry. My friends are waiting inside."

Not only taller than he, but a year or two older. And as beautiful and unattainable as the rings of Saturn.

He wanted to say — Look, I know everything about your body, I know the shape of your breasts and the size of your nipples and I know that your hair down below is dark instead of blonde and that you've got a little brown birthmark on the left side of your belly, and I think you're absolutely beautiful and if you will only let me undress you and touch you a little I will worship you forever like a goddess.

But Karl-Heinrich said none of that, said nothing at all, just stood mute where he was, looking longingly at her as though she were a goddess in actual fact, Aphrodite, Astarte, Ishtar, and she gave him another sad little perplexed smile and turned from him and went into the coffee shop, leaving him alone and crimson-cheeked and gaping like a fish in the street.

He felt shock and anger, although no real surprise, at the reaction. He felt great sadness. But also, he realized, a touch of relief. She was too beautiful for him: a cold pale fire that would consume him if he came too near. He would only have behaved like a fool if she had gone inside with him, anyway. In his reckless hungry over eagerness, he knew, he would have ruined things almost immediately.

Beautiful girls were so frightening. But necessary. Necessary. Nothing ventured, nothing gained. Why, though, did it always end like this for him?

A swirling gust of snowy wind came roaring down the square at him and sent him shivering off toward the north, lost in a daze of bitter self-pity. Aimlessly, planlessly, he went wandering up along Melnikova and into the maze of ancient little cobblestoned streets leading to the river. In 10 minutes he was at the Charles Bridge, peering across at the somber mass of Hradcany Castle dominating the other bank.

They didn't floodlight the castle any more, now that the Entities were here. But you could still make it out, the great heavy blackness of it on the hill, blotting out the stars of the western sky.

The whole castle area was sealed off now, not just the cathedral but the museums, the courtyards, the old royal palace, the gardens, and all the rest that had made the place so attractive to tourists. Not that there were any tourists coming to Prague these days, of course. Karl-Heinrich's mind summoned the image of the gigantic all-conquering aliens whom mankind called the Entities, moving around

within the cathedral as they went about their unfathomable tasks. He thought with some astonishment of the boast that had so unexpectedly sprung from his lips. *What I've just accomplished, you see, is a very of jacking right into the main computers of the Entities. I can actually spy on their communications line!* Of course there was no truth to it. But could it be done? He wondered. Could it? Could it?

I'll show her, he thought wildly. Yes.

Go up to the castle. Break in somehow. Connect with their computers. There has to be a way. It's only a sequence of electrical impulses; even they need to use something like that, ultimately, in any sort of computational device. It will be an interesting experiment — an intellectual challenge. I am a failure with women but I have a very fine mind that needs constantly to be kept in play so that its edge will remain keen. I must forever improve my own range of mental ability through constant striving toward excellence.

And so. Connect with them. And not just connect! Open a line of communication with them. Offer to teach them things about our computers that they can't possibly know and want to learn. Be useful to them. Somebody has to be. They are here to stay; they are our masters now.

Be useful to them, that's the thing to do.

Earn their respect and admiration. I can be very helpful, that I know. Get them to trust me, to like me, to become dependent on me, to offer me nice rewards for my further cooperation.

And then —

Make them give her to me as a slave.

Yes. Yes.

Yes.



ON THE FIRST DAY OF THE NEW YEAR, AT HALF PAST FOUR IN THE MORNING, KARL-HEINRICH Borgmann achieved his first successful contact with the communications network of the Entities.

He didn't expect it to be easy, and it wasn't. But he wasn't expecting to fail, and he didn't.

— Hello, there, he said.

By this time, a good deal of information about the aliens' data-processing systems had already been accumulated, bit by bit, by this hacker and that one, here and there around the world. And, despite the deficiencies in the old global Net that had been caused by the Entities' concurring masterstroke — the worldwide interference with the flow of electrical power on Planet Earth, the terrifying global shutdown that had become known as the time of the Great Silence — most of this information had already been disseminated quite extensively by way of the reconstituted post-Conquest hacker network.

Karl-Heinrich was part of that network. Operating under the cognomen of Bad Texas Vampire Lords, he had built up associations with such European and even American centers of information as Interstellar Stalin, Pirates of the Starways, Killer Cracklers from Hell, Mars Incorporated, Dead Inside, and Ninth Dimension Bandits. From them, and others like them, he had picked up whatever shards of data about the Entities' computational modes that he could find, everything incomplete, a scintilla here and a particle there, a morsel here and a scrap there.

A lot of it was wrong. Much of it was excessively hypothetical. Some of it was entirely the invention of its disseminators. But — here and there, in the two years and two months since the Conquest — certain gifted hackers had managed to learn a few things, little nuggets of fact, that actually seemed to make sense.

They had done it by interviewing anyone who had had a chance to observe the doings of the Entities at close range and seen Entity computers in action. That meant dredging through the recollections of anyone who had been taken aboard the Entity starships, for one thing. Plenty of people had had that experience: The Entities, though they never explained a thing about their actions, were plainly curious

about the inhabitants of the world they had conquered. Some of these abductees were hackers themselves, who had paid very close attention. There even were hackers who had managed to infiltrate human slave-labor gangs and take part in the incomprehensible reconstruction schemes of which the Entities were so fond. There was much that could be learned from that nasty experience.

And so they had garnered a few clues about the way the invaders sorted and processed and transmitted information; and they had put it all out there on the Net for their fellow hackers to see and ponder. And out of that assortment of crumbs, dribblets, rags, tags, tatters, and wild guesses, methodically filtering out the parts that were incompatible with the rest, Karl-Heinrich had eventually put together his own internally consistent picture of how the Entity computers might operate and how they could be hacked.

— Hello, there. I am Karl-Heinrich Borgmann of Prague, the Czech Republic.

The Bad Texas Vampire Lords — or, rather, the solitary and peculiar boy who lurked behind that particular nom-de-Net — did not rush to share these insights with the other subversive organizations of the hacker world. It might have been useful to the cause of humanity if he had, because it would have advanced everybody's knowledge of the situation and, very likely, led to even greater understanding. But Karl-Heinrich had never been good at sharing things. There had never been much of a way for him to learn how to do it. He was the only child of remote, austere, forbidding parents. He had never had a close friend, except via the Net, and those were always long-distance friendships, anonymous, carefully controlled. His love life, thus far, had not progressed beyond electronic voyeurism. He was an island unto himself.

Besides, he wanted full credit for cracking the Entity code. He wanted to be world famous, the best hacker ever. He wanted to be immensely famous. If he couldn't be loved, he could at least be admired and respected. And — who knew? — if he became famous enough, platoons of girls might stand in line outside his door for a chance to give themselves to him. Which was the thing he wanted above all else.

— Hello, there. I am Karl-Heinrich Borgmann, of Prague, the Czech Republic. I have made myself able to interface with your co computers.

Already, beyond any question, it had become clear to everyone who had worked on the problem that the Entities used a digital system of computation. That was welcome news. After all, being aliens, they might have had some altogether alien way of processing data that would be beyond all human fathoming. But it had turned out that even on the far-off unknown star of the Entities the good old binary system was the most efficient way of counting things, even as on primitive little Earth. Yes or no; on or off; go or no-go; positive or negative; open or closed; present or absent; one or zero — there was nothing simpler. Even for them.

The Entity mainframe computers themselves were bio-organic devices with liquid software reservoirs, apparently. In essence, huge synthetic brains. They seemed to be, as human brains are, chemically programmable, responding to hormonal inputs. But that was only an operational fact. In the most fundamental sense they could be understood to be, almost certainly, electrically operated mechanisms; again, just as human brains are. Computations were achieved by the manipulation of charge. The chemical inputs changed electrical potentials; they turned ones into zeros, presences into absences, ones into off's.

The chemical inputs, perhaps, could be duplicated electrically, just as they were in the implanted biochips that had become all the rage among hackers like Karl-Heinrich a year or two before the invasion. Karl-Heinrich set out to try.

— Hello, there. I am Karl-Heinrich Borgmann, of Prague, the Czech Republic. I have made myself able to interface with your computers. This has been the great dream of my life, and now I have achieved it.

He spent a couple of dark wintry days up on the steep hill behind Hradcany Castle, snooping around the deserted streets outside the

ancient wall. It wasn't possible to get into the castle grounds any more, of course, but that didn't mean you couldn't tap into electrical conduits that did. Unless the aliens could pull electricity out of the air by alien magic, they needed distribution lines for their power just like anyone else. And unless they had installed their own generating systems within the castle, which was an altogether plausible possibility, the lines had to come in from outside.

Karl-Heinrich went looking for them, and in short order he found them. He was very good at such things. When other little boys had been reading about pirates or spacemen, he was reading his father's textbooks on electrical wiring.

Now — first contact —

Karl-Heinrich carried his own tiny computer with him at all times, an implant, right there in his forearm — a biochip no bigger than a snowflake, and even more elegant of design. It collected and deployed body warmth to amplify and transmit coded signals that opened data channels, making possible all sorts of transactions. Karl-Heinrich had been one of the first to get implanted, the day after his 13th birthday. Perhaps 10 percent of the population, most of them young, had had implants installed by the time of the arrival of the Entities. The implant revolution, though still only in its earliest stages, had been widely seen as full of promise for the fantastic flowering future — a future that, unfortunately, the alien invasion had apparently aborted. But the implants were still in place.

Tapping into an electrical meter was child's play for Karl-Heinrich. Any power-company meter-reader could have done it. Karl-Heinrich was something more than a meter-reader. He spent two days measuring inductances and impedances, and then, too excited now even to remember to breathe, he sent a tendrill of electrical energy into the meter and through it, down a surging river of electrons, until he felt himself make contact with —

Something.

A data source. Alien data.

It made him shiver to feel the alienness of it, its shape, its internal structure, its finlike configurations. He felt as though he were walking the mysterious glades of an utterly strange forest on an unknown world.

The system through which it was flowing was nothing like any computer he had ever known, or even imagined. Why should it have been? Nevertheless he sensed familiarity amid the strangeness. The data, however strange, was still only data, a series of binary numbers. The shape of that digital flow was weird and bizarre, and yet he felt somehow confident that it was well within the reach of ultimate comprehension by him. The alien device into which he had tapped was, after all, a system for the manipulation and storage of data in binary form. What was that, if not a computer?

And he was inside it. That was the important thing. A hot tingle of sheer intellectual joy ran through him at the contemplation of his triumph. It was almost orgasmic in its intensity. He doubted that sex itself could provide such a thrill. But of course Karl-Heinrich had very little grounds for such a comparison.

It took him quite some while to understand the particular nature of what it was that he had touched. But gradually it dawned on him that the program within which he was wandering must be the master template for the whole electrical distribution grid; and suddenly there was a map of the Entities' electrical system superimposed on the map of the castle grounds that he had in his head.

He explored it. Very quickly he found himself trapped in a blind alley, went back, took another path. Another and another. Hit a roadblock, went around it, plunged forward.

His confidence grew from hour to hour. He was discovering things. He was learning. Things were adding up. He was piecing together correlations. He had found channels. He was on the inside, yes; and every moment he was getting deeper and deeper in.

The delight was intense. He had never known such pleasure.

He copied a swatch of data from an Entity computer, downloaded it into his own, and was pleased to see that he was capable of manipulating it by adding or subtracting electrical charge. He had no way of knowing what changes he was making, because the underlying

data was incomprehensible to him. But it was a good start. He was able to access the information; he was even able to process it; all that was missing was some way of understanding it.

He realized that even at this primitive stage of his penetration of the system he should be able to send the Entities messages that they would be able to understand, if they had bothered to learn any of the languages of Earth. And he suspected that he could even eventually learn to reprogram their data through this line of access, if only he could figure out their computer language. But that was something to deal with later on.

He went onward, inward, wondering whether he might be sounding any alarms within the system as he went. He didn't think so. They would have stopped him by now if they knew that he was booging inward like this. Unless, of course, they were amused by what he was doing, watching him, applauding his progress.

Before long his head was aching miserably, but his heart had begun to swell with a gathering sense of triumph.

Karl-Heinrich was certain now that the center of everything, the main computational node, was, as was already generally suspected, inside the cathedral. He had located something major down at the far end, in the Imperial Channel, and something almost as big in the Chapel of St. Sigismund. But these, he suspected, were subsidiary trunks. There was a huge floor-to-ceiling screen full of pulsing lights in front of the Wenceslas Chapel that was a raging circus of energy, in and out, in and out. He realized, after probing it for four or five hours, that it had to be the master interface of the whole set up, the traffic manager for everything else on the premises.

He jacked in, via the power line, and let oceans of incomprehensible data surge through him.

The alien information came at him in a gigantic flood, too voluminous even to try to copy and download. He did not dare to attempt to process it and certainly had no way of decoding it. All it was was a stream of ones and zeros, but he had no key to help him translate the binary digits into anything meaningful. He would need some gigantic mainframe, like the one that the university once had had, even to begin making an attempt at that. The world's mainframes were down for good, though. The Entities had blown them all out in the moment of the Great Silence and they had stayed that way. The present-day version of the Net worked by virtue of a jerry-built string of patched-together servers that was barely capable of handling ordinary traffic, let alone of processing anything as intricate as what Karl-Heinrich had stumbled upon.

But he had made contact. That was the key thing. He was on the inside.

AND NOW, NOW, NOW, THE BIG DECISION STARED HIM IN THE FACE. SIMPLY CONTINUE TO SPY IN secrecy on the Entity computer as a skulking loner, soaking up all this interesting gibberish, tinkering with it on the sly purely for fun, making a nice gratifying private hobby out of it? Or should he link up with Interstellar Stallion, Ninth Dimension Bandits, and the rest of the hackers who were working at the problem of entering the Entity network, and show them what he had managed to achieve, so that they could build on his achievement and carry the process on to the next level?

The first alternative would bring him nothing but the pleasures of solitary vice. Karl-Heinrich already knew how limited those were. The second would give him a momentary flicker of fame in the hacker underground; but then others would seize what he had done and run onward with it and he would be forgotten.

But there was a third choice, and it was the one he had favored all along.

All the hacker talk of mastering Entity computer code and using the knowledge somehow to overthrow them was mere childish stupidity. Nobody was going to overthrow the Entities.

They were too powerful. The world was theirs, and that was that.

Accept that, then. Work with it. Offer them your services. They need an interface between themselves and humanity for the more efficient carrying out of their purposes. Very well. Here's an opportunity for you, Karl-Heinrich Borgmann. You have everything to gain and nothing but your misery to lose.

Their signals were incomprehensible to him, but his would not be to them, and contact had been made. Very well. Do something with it.

— Hello, there. I am Karl-Heinrich Borgmann, of Prague, the Czech Republic. I have made myself able to interface with your computers. This has been the great dream of my life, and now I have achieved it.

— I think I can be of great help to you. And I know that you can be of great help to me.

AND SO IT CAME TO PASS, AS ONE YEAR SHADED IMPERCEPTIBLY INTO THE NEXT AND THE ERA OF alien rule of Earth went on and on, Karl-Heinrich did indeed make himself useful to the Entities; and thus, by so doing, he made things a good deal better for Karl-Heinrich Borgmann.

When he was 16, living out his dark and lonely adolescent days, he had wanted three things above all: prestige, power, fame. Now he was 29, and he had them.

Prestige, certainly.

He knew more about the Entities' communications systems, and probably about the Entities themselves, than anyone else on Earth. That was a widely known fact. Everyone in Prague knew it; perhaps everyone on the planet. He was the master communicator, the conduit through whom the Entities spoke to the people of the world. He was the Maharajah of Data. His name itself had become a title. He was Borgmann the borgmann, the prime facilitator. There was prestige in that, certainly. You had to respect someone who had achieved what she had achieved, however you might feel about the morality of the achievement.

And power. He had that too, *in ezzeelsis*.

From his glistening office on the top floor of the majestic riverfront building that had once been Prague's Museum of Decorative Arts, he could connect with the Entity Net at 50 different points around the world. He, and only he, knew the way in, knew how to insert himself in their data banks, how to swim through the surging currents of those rivers of alien computation. Anyone in the world who wanted to make contact with the Entities for whatever reason, to file a petition, to enroll in their service, to request information from them, had to go through his office, his interface. The Borgmann interface: He had shipped his own name right on it for all to see.

Power, yes. He was, in a way, the master of life and death, here. What he understood, and hardly anyone else did, was that the Entities paid essentially no attention to all those petitions and requests and even the offers of service. They were above all that, mysteriously drifting through levels far beyond human ken. It was he who dealt with most of these people's urgent requests, passing them along to the Entities for decisions that probably would never be made, or, often, interposing his own decisions on the assumption that the decrees he issued were approximately what the Entities would have chosen to do if only they had deigned to pay attention to any of the applications. He who proposed and disposed, he who assigned, transferred, rearranged, reorganized. Whole population sectors were uprooted and moved about on his say-so. Huge public-works projects came into being because he believed that the Entities desired them to exist. Was that not power? Supreme power? Was he not the Entities' viceroy on Earth?

And fame —

Ah, a touchy matter, that. There was fame and then there was fame. Certainly the inventor of the Borgmann interface was world famous.

Karl-Heinrich knew quite well that (his fame was not entirely a) positive thing. His name had become (a common noun, now, in the popular speech of every land: borgmann. And what it meant, that word, was traitor.)

But Karl-Heinrich knew quite well that his fame was not entirely a positive thing. He was aware that his name had become a common noun, now, in the popular speech of every land: *borgmann*. And what it meant, that word, was "traitor." What it meant, that word, was "judas."

Well, he could do nothing about that. He was what he was; he had done what he had done. He had no regrets. He had meant no harm. It had all been an intellectual game for him, opening the interface between human computational systems and those of the aliens. A test of his abilities, which he had triumphantly passed. If he had not done it, someone else would have. And if he had never even been born, the world would have been no worse off than it now was. Borgmann or no Borgmann, the Entities still would be here; still would rule, in their unfathomable, almost random way; still would be arranging and rearranging the conquered world in whatever ways they found amusing. He had merely facilitated things a little.

And here he was in this magnificent office, paneled with the rarest of exotic woods brought in at infinite expense from the rain forests of South America, up here on top of this wonderful old French Renaissance Revival building, sitting here with a billion koruna worth of state-of-the-art computer hardware of his own design all around him, and the museum's own spectacular collection of glassware and ceramics and silver serving dishes and 19th century furniture still in place behind him in the surrounding hallways.

Karl-Heinrich rarely bothered to look at those things, indeed knew very little about most of them, but they were there for his amusement whenever he felt like strolling among them. He had had some of the paintings brought down from the National Gallery on Hradcany Hill too, a Holbein and a Cranach and that sexy *Stucette* by Vouet, and his lavish Art Nouveau penthouse apartment a few blocks away was equally satisfactorily decorated with the national art — Renoir, Gauguin, Picasso, Braque. Why not? No one was allowed to go to the museum any more anyway, because it was on the castle grounds, where the Entity command compound was, and did they actually expect him to live in an apartment with bare walls?

Transferring the paintings had been a matter of a few simple key-strokes. Transferring some woman he fancied to his bed was just as easy. A work requisition had to be put through that was all. The work involved service in the office of Karl-Heinrich Borgmann. You got the order, and you went, no questions asked, though you were only too well aware of what the "service" entailed. Because the alternative would surely be a lot worse: transfer to a work camp in Antarctica, transfer to sewer-sewering duty in Novosibirsk, transfer to a latrine-cleaning job at a medical clinic in the middle of Africa. Or, if not you, then something equally terrible for your aged mother, your beloved babe, your husband, your cat.

Karl-Heinrich had not forgotten those evenings, 10 years ago, 11, 12, when he had wandered disconsolate through the dark streets of Prague, gazing with insatiable longing at the girls he saw walking just ahead of him, or the ones sitting with their beams in brightly lit cafes, or those standing before their mirrors in third floor apartments. All of them as inaccessible to him as the inhabitants of alien worlds, those girls were. Then.

Well, he had access to them now. A long procession of them had marched through his bedroom in his years as Borgmann the borgmann. Starting with the girls he had lust after in school, those

of them who had survived the Great Plague: Jarmila and Magda, Eva, Jana, Jaroslava and Ladnuila, the other Eva with the flat face and the wonderful bosom, and Osvalda, Vera, Ivana, Maria, Zuzana of the fiery hair, Bozena of the fiery temper, Milada, Jirina, Milena. He had had a long list to work his way through. Glorious Stepanka, alas, had died; he requisitioned her sister Katrina instead. And then Anna, Sospitha, Theresa, Josefa. The other Milada, the tall one; the other Ladnuila, the short one. And both Maritimes. Some came with hatred in their eyes, some came in sullen indifference, some saw his bed as their gateway to special privilege. But they all came. What choice did they have?

OH, YES, AND BARBRO EKELUND, TOO. ONE OF THE VERY FIRST, EVEN BEFORE JARMILA AND MAGDA AND EVA and the rest. The Swedish girl, the one for whom he had invented the myth of being able to tap into the Entity computers, the spontaneous boast that had been the beginning of all this for him. Barburo of the long slender limbs, the unexpectedly full breasts, the golden hair, the sea-green eyes.

"Why am I here?" she had asked, the first time he requisitioned her.

"Because I love you."

"You don't even know me. We've never met."

"Oh, we have, we have. It was in August last year, in the Stare Mesto. You forgot."

"August. The Stare Mesto." A blank look.

"And then again at Christmastime. In the street. I wanted to buy you a coffee, but you were too busy."

"I'm sorry. I don't remember."

"No. You don't remember. But I do. Please, now, your clothes. Take them off."

"What?"

"Please. Right now." He was 17, then. Still new at this. Had had only four women up till that point, counting the first, and he had had to pay for that one, and she had been very stupid and smelled of garlic.

"Let me leave here," she had said. "I don't want to undress for you."

"Ah, no, you will have to," he said. "Look." And he went to his computer, and from it came an official labor-requisition form, Barburo Ekelund of Dussel Street, Prague, assigned to hospital orderly duty, the Center for Communicable Diseases, Bucharest, Romania, effective three days hence. It seemed quite authentic. It was quite authentic.

"Am I supposed to believe that this is real?" she asked.

"You should. When you get home today, you'll find that your residence permit has been revoked and your ticket for Bucharest is waiting for you at the station."

"No. No."

"Strip, then, please," he said. "I love you. I want you."

So she yielded, because she knew now that she had to. Their love-making was chilly and far from wonderful, but he had expected nothing much better. Afterward he revoked her transfer order, and, because he was still new at this then and had some residual human feelings of guilt still in his system, he wrote new orders for her that allowed her a year's entry privileges at the swimming facilities in Modruny, and a season pass for two to the opera house, and extra food coupons for her and her family. She offered him the most rudimentary of thanks for these things, and did not take the trouble of concealing from him the shudder that ran through her as she was dressing to leave.

He had her come back five or six more times. But it was never any good between them, or by then Karl-Heinrich had found others with whom it was good, and who at least were able to make him think so; and so he left her in peace after that. At least he had had her, though. That was why he had given himself over to the Entities in the first place, so that he might have Barburo Ekelund; and Karl-Heinrich Borgmann was the sort of person who followed through on his intentions.

Now it was a dozen years later, an August day again, sunny, warm — sweltering, even; and on his screen was the information that

a certain Barburo Ekelund was downstairs, desiring to see him, a matter of personal importance that would be of great interest to him.

Could it be? The very same one? It must. How many other Swedes could there be in Prague, after all? And with that very name.

Visitors here were unusual, except for those people whom Karl-Heinrich summoned to him, and he certainly had not summoned her. Their encounters of long ago had been too bleak, too chilly; he did not look back on them with sentimental fondness or longing. She was nothing more than a phantom out of his past, a wandering ghost. He leaned toward the mouthpiece of his servo and began to order her to be sent away, but cut himself off after half a syllable. Curiosity gnawed at him. Why not see her? For old times' sake despite everything, a reunion with an artifact of his unhappy adolescence. There was nothing to be afraid of. Surely her resentment had died away, after all this time. And she was so close to having been the first woman he had ever possessed: the temptation to see what she looked like today overtook him.

He told the servo to send her up, and activated the security spy-eyes mounted in his walls, just in case. No one, nothing, could get within his safety perimeter while the security field was on. It was a reasonable precaution for a man in his position to take.

SHE HAD CHANGED, HAD CHANGED A GREAT DEAL. STILL SLENDER AND FAIR, YES, THE GOLDEN hair, the sea-green eyes. Still quite tall, of course, taller than he. But her radiant Nordic beauty had faded. Something was gone: the ski-slope freshness, the midnight-sun glow. Little lines at the corners of her eyes, along the sides of her mouth. The splendid shining hair somewhat dulled. Well, she was 30, now, maybe 31; still young, still quite attractive, actually, but these had been hard years for most people.

"Karl-Heinrich," she said. Her voice was calm, neutral. She seemed actually to be smiling, though the smile was a distant one. "It's been a long time, hasn't it? You've done well for yourself." She gestured broadly, taking in the paneled office, the river view, the array of computer equipment, the wealth of national artistic treasures all about him.

"And you?" he said, more or less automatically. "How have you been, Barburo?" His own tone sounded unfamiliar to him, oddly cozy. As though they were old friends, as though she were not merely some stranger whose body he had used five or six times, under compulsion, a dozen years before.

A little sigh. "Not as good as I would wish, to speak the truth," she said. "Did you get my letter, Karl-Heinrich?"

"I'm sorry. I don't recall." He never read his mail, never. It was always full of angry screeds, execrations, denunciations, threats.

"It was a request for assistance. A special thing, something only you would really understand."

His face turned bleak. He realized that he had made a terrible mistake, letting a petitioner get in here to see him in person. He had to get rid of her.

But she was already pulling documents out, unfolding papers in front of him. "I have a son," she said. "Ten years old. You would admire him. He is wonderful with computers, the way you must have been when you were growing up. He knows everything about everything that has to do with them. Gustav, his name is. Look, I have his picture here. A handsome boy."

He waved it away. "Listen, Barburo, I'm not in need of any protégés, if that's what you came here to —"

"No. There is a terrible problem. He has been transferred to a work camp in Canada. The order came through last week. Somewhere far in the north, where it is cold all the time, a place where they cut trees down for paper mills. Tell me, Karl-Heinrich, why would they want to send a boy of not even 11 years to a logging camp? Not to work with the computers. It is a straight manual-labor requisition. He will die there. It is surely a mistake."

"Errors do get made, yes. A lot of these things are purely random." He saw where this was heading.

He had no friends. There was no one he loved. There was, he knew, no one who loved him. That was satisfactory to him. There was nothing Karl-Heinrich Borgmann needed (that he could not simply reach out and take.)

He was right.

"Save him," she said. "I remember how you wrote out transfer orders for me, long ago. And then changed them. You can do anything. Save my boy, I beg you. I beg you. I'll make it worth your while."

She was looking at him in a stricken way, eyes fixed, every muscle of her face rigid.

In a low, crooning voice she said, "I will do anything for you, Karl-Heinrich. You wanted me as a lover, once. I held myself back from you, then, I would not allow myself to please you, but I will be your lover now. Your slave. I will kiss your feet. I will perform any act you ask of me. The most intimate things, whatever you desire. For as long as you want me, I am yours. Just save him, that I beg of you. You are the only one who can."

She was wearing, on this humid summer day, a white blouse, a short blue skirt. As she spoke she was unbuttoning herself, tossing one garment after another to the floor. The pale heavy mounds of her breasts rose into view. They were glistening with perspiration. Her nostrils flared; her lips drew back in what apparently was meant as a hungry, seductive smile.

I will be your slave. How could she have known? His very fantasy, of so many years ago!

He was beginning to develop a headache. Save my boy. I beg you. I will be your slave.

Karl-Heinrich didn't want Barbro Ekelund to be his slave, not any more. He didn't want Barbro Ekelund at all. He had yearned for her long ago, yes, desperately, when he was 16, and he had her, for what-ever that had been worth, and that was that; she was history, she was an archival fact in his memory, and nothing else. He was no longer 16. He had no desire for ongoing relationships. He wanted no sentimental reardons with figures from his past. He was content simply to call women up by computer almost at random, new ones all the time; have them come to him, briefly serve him, disappear forever from his life.

All those troublesome human entanglements, those messy little snarls of dependency and whatnot, that any sort of true personal transaction involved; he had tried to avoid them all his life, had kept himself as far above the worldly fray as any Entity, and yet from time to time he seemed to find himself becoming ensnared in them anyway, this one wanting a favor, that one, offering some sort of *quid pro quo* as though he needed one, people pretending they were his friends, his lovers. He had no friends. There was no one he loved. There was, he knew, no one who loved him. That was satisfactory to him. There was nothing Karl-Heinrich Borgmann needed that he could not simply reach out and take.

Even so, he thought. Be merciful for once. This woman meant something to you for a little while, a long time ago. Give her what she wants, do what needs to be done to save her son, then tell her to put her clothes on and get out of here.

She was naked now. Wriggling provocatively before him, offering him in a way that would have made him delirious with delight many years ago, but which seemed only absurd to him, now. And in another moment she would step within the security perimeter.

"Watch out," he said. "My desk area is guarded. If you get any closer, you'll trip the barrier screen. It'll knock you cold."

Too late.

"Oh!" she cried, a little gasp. And flung up her arms, and went spinning backward.

She had touched the security field, it seemed — at least the fringe

of it — and had had a jolt from it. She recoiled from it dramatically. Karl-Heinrich watched her stagger and lurch and crumple and go tumbling to the floor, landing with a hard thump in the middle of the room. There she pulled herself instantly into a little ball, face down in a huddled sobbing heap, her forehead grinding into the ancient Persian carpet from the museum. This was the first time Karl-Heinrich had seen anyone encounter the field. Its effect was even more powerful than he had expected. To his dismay she seemed now to be going into hysterics, her whole body jerking convulsively, her breath coming in wild gulping gasps. That was annoying, annoying and yet somehow sad, too. That she should suffer so.

He wondered what to do. He stood over her, staring down at her twitching naked form, seeing her now as he had seen her in that illicit spy-eye view of all those years ago, the fleshy white buttocks, the slim pale back, the delicate tracery of her spine.

For all his earlier indifference, a surprising touch of desire arose in him now, even in the midst of her agony. Because of it, perhaps. Her vulnerability, her misery, her utter pitifulness; but also that smooth taut rump heaving there, the lovely slender legs coiling beneath her. He knelt beside her and let his hand rest lightly on her shoulder. Her skin was hot, as though she were feverish.

"Look, there's really no problem," he said gently. "I'll get you your son back, Barbro. Don't carry on like that. Don't."

Moans came from her. This was almost like a seizure. He knew that he should send for help.

She was trying to say something. He could not make out the words, and leaned closer still. Her long arms were splayed out wide, the left hand drumming in torment on the floor, the other one clutching at the air with quivering fingers. Then, suddenly, she was turning, rolling over to face him, jerking and twitching no longer, and there was a ceramic knife in that outstretched hand, arriving there as though by magic — pulled out of thin air! Out of her pile of discarded garments — and, utterly calm and poised, she rose toward him in a single smooth movement and thrust the blade with extreme force, with astonishing strength, deep into his lower abdomen.

Pulled it upward. Brought it ripping like an irresistible force through his internal organs until it came clinking up against the cage of his ribs.

He grunted and clasped his hands to the gaping wound. He could barely cover it with his few outspread fingers. Surprisingly, there was no pain yet, only a dull sense of shock. She rolled backward from him and sprang to her feet, looming over him like a naked avenging demon.

"I have no son," she said vindictively, biting off the edges of the words, as his eyes began to dim.

Karl-Heinrich nodded. Blood was spouting from him, covering the Persian carpet with a pool of blood. He attempted to tell the servo to send help, but he found himself unable to make a sound. His mouth opened and closed, opened and closed, in soft furry silence. In any case what good would calling for help do? He could feel himself already dying. His strength was leaving him with every spurt. Eyesight growing blurry, inner systems shutting down. He was finished, a dead man at 29. He was surprised how little he cared. Perhaps that was what dying was like.

So they had caught up with him at last.

How odd that she would be the one. How appropriate.

"I've dreamed of this for 12 years," the lovely assassin said. "We all have. What joy it is to see you like this now, Borgmann." And said again, this time making the name sound like the curse it had become: "*Borgmann*."

Yes. Of course. That was *Borgmann*, no capital letter.

She had killed him, all right.

But there was consolation all the same, he told himself. He would die famous. His very name was part of the language now; that he knew; that knowledge he hugged lovingly close to himself as his life dwindled away. *Borgmann ... borgmann ... borgmann*. He would be dead in a few moments more, but his name — ah, his name, his name — that would be immortal, that would march on through human history forever. □

BELOW: Artist Gary Ruppel's first science-fictional project was this print Budweiser advertisement for Anheuser-Busch



The Life & Times of GARY



by Michaela Roessner

I first met Gary Ruddell in 1974 at the California College of Arts and Crafts in noted illustrator Joe Cleary's illustration course. I was taking the odd class at my alma mater while recovering from being banged up in a traffic accident and also trying to get myself enthused enough to put together a portfolio to apply to graduate school. Gary was in his last semester before he graduated with his Bachelor of Fine Arts.

Gary was already known as a hot shot to his peers in C.C.A.C.'s illustration department. The year before he'd worked as a staff artist for KTVU Channel 2, and in high school he sold drawings to car and motorcycle magazines. The word was he'd probably be one of the few to succeed in the competitive, high-pressure world of commercial art.

The word was also that the only factor that might waylay his future was that he seemed to set the standard for that archetypal breed, the California Party Animal. For example, at the end-

RUDDELL



ABOVE: Michael Flynn's novel *The Nanotech Chronicles* gave Rudeff the chance to mix together both horror and SF imagery.

of-semester party Joe Cleary always held for his illustration classes, Gary and his friend Will showed up prelubricated and about thirty sheets to the wind. Among other pretty humorous high links over the course of the evening, Gary decided that my full-length leg cast, propped up on a table so all my blood wouldn't drain down to my toes, might make a terrific boogo drum. Although he was completely charming about it and meant no harm—I should make it clear right here that there's not a single mean bone in all of Gary's long,

lanky body—still, his musical efforts got sufficiently enthusiastic that he had to be hauled off my cast before I had to be hauled off to Kaiser Hospital's replastering department.

As my husband Richard and I got to know Gary better over the next few years, at first that seemed to be the balancing act Gary had chosen to perform: the wild sber-bachelor who by some miracle managed to keep on top of all the wonderful jobs that appeared to drop like manna from heaven smack dab onto his drawing table. In short order he had illustrations in *Rolling Stone*, *Chic*, *Mother Jones*, and *Playboy*. He got coveted assignments with the Levi Strauss company, Wrangler Boots, beer companies, upscale herbal tea companies. Among his first art-of-the-fantas-tic pieces, for which he'd always had a natural flair, were wonderful cards for Paper Moon graphics, including a werewolf eating the cherry off a sumptuous plate of birthday cake and ice cream.

But after a few more years, we began to get sneaking suspicions about Gary.

He was earning good money but he lived in a sparsely furnished inexpensive apartment. He drove an old VW bug. It was excruciating to watch him fold his mantis-like limbs trying to tuck himself into it. He religiously maintained the little car himself.

His girlfriends adored him, but in private their one complaint was that he didn't seem to be into going out on the town and carousing all night. He'd come to visit us and shock the "old married couple" with leering tales of his love life, but one day when he dropped in to visit fellow illustrator Vincent Perez, who was teaching a drawing class at C.C.A.C., Gary suddenly realized that the very naked model sitting up on the stand was the wife of a good friend of his. He turned fish belly white with embarrassment, then bright red, spun about on his heel and left the classroom without saying a word. This is true! I was there!

I saw it!

Slowly but surely the awful truth came out. Gary was a 100%, ched-in-the-wool dedicated artist. He religiously maintained a potential client list and mailed out expensively produced flyers of new work several times a year. All those great illustration gigs? He'd paid his dues and earned them. He really didn't party much at all, driving his girlfriends crazy by preferring to stay up late at night hunched over his drawing table working.

Succeeding at commercial art wasn't enough for him. His parsimonious ways allowed him to schedule time off commercial work so that he could continue to develop his already phenomenal painting skills and work on his fine arts portfolio. This has led to his paintings inclusion in exhibits at museums and galleries across the country.

Gary finally got tired of living in the tiny apartment and bought a house in Marin



TOP LEFT: Keith Laumer's *Return of Retief* let the artist get his hands on one of SF's favorite scraps. ABOVE: An Hitachi Semiconductor ad campaign was the excuse for this War of the Worlds-like scene. BELOW: Both genders will be fighting in the future, at least according to Riddell's cover for *Invasion*, the fourth volume in Jerry Pournelle's *War World*.



ABOVE: Dan Simmons' Hugo Award winning novel made history, but so did Ruddell's visualization of the character known as the Shrike.



County. He fell in love, got married, started a family. I've never heard him talk about his wife in terms other than complete devotion, love and respect. He adores his children. His former wild reputation was at last completely destroyed. He's had to rest on the more modest laurels of being a nice guy and an immensely hard-working and talented artist.

Luckily all his wild zaniness didn't go to waste: it found new avenues of expression as he became more involved in the speculative fiction field.

By the mid to late eighties Gary was producing a fair amount of genre covers, including the reprinting of the *Thieves' World* series. At the same time, I was beginning to publish my writing in the field, starting with *Wuthabout Women*. Gary used friends for models frequently — both Richard and I are on several of his covers. When we'd get together I'd ask Gary if he ever went to conventions or hung out with other artists of the fantastic. He said no; that though he liked most of the editors and other professionals he'd had contact with, this was a business to him, not an opportunity to socialize. I told him my impression was that speculative fiction illustrators were a pretty nice bunch, that they enjoyed each other's company and were very supportive of each other besides. Still, he had a legitimate point. By being strict with himself and very professional he'd accomplished everything he'd ever set out to do.

In 1990 Richard and I moved away from the Bay Area and up to the mountains. We talk to Gary maybe once or twice a year on the phone. One day I got the phone call from Gary I'd suspected might come my way some day. I can't remember the exact words, of course, so I'm taking a little poetic license to try to reconstruct the heart and intent of the dialogue. Gary, please forgive me.

Gary: "Wow, I just went to a science fiction convention and it was just incredible!"

Me: "Oh, really?"

Gary: "I hung out with all these artists and it was amazing — they took me in and made me feel completely welcome! They're wonderful! We partied and talked about art and did panels together. I feel like I've known them my whole life. Did you know they did stuff like that? I'm going to go to a lot more conventions!"

Me: "That's nice."

I was pretty good, that telephone call. But when it was suggested that I write this article, the petty side of me couldn't resist the opportunity to at last say, "Gary, I told you so."

Since then I've watched as Gary has become more and more involved with the field, creating the images you see here on these pages, and more. Enjoy. And if you run into him at a convention and have a chance to hang out and party with him a little, also enjoy. He's a good guy. □

THE TRUEST CHILL

Continued from page 42

"Yes."

"Show it to me."

That one was even badder; a single line of data: *The Security Agent* — *Suyin Ming*. In a steady voice Suyin said, "There should be a reference underneath. Show it."

The passage had been edited for relevance, which had the effect, she soon discovered, of distilling its potency almost beyond endurance. "... *Who solemnly monitored the stream of battle and overhead mail like a health inspector lifting patients' gowns in a reverent swirl. ... Loathe to take even a prurient interest in the sorry disclosures because she had been taught not to, Ching took comfort in seeing the truth of her judgments borne out: the teen-aged boy she identified as a troublemaker indeed ended up an unskilled laborer, while the dissident researcher proved a discontented mediocrity, soon to be passed over for promotion. ...*

There was more, but she did not read it. Suyin blanked the wall and sat back, retreating behind her crossed arms.

The video version might bear her face, but this went surely farther. Alone yet exposed, Suyin knew herself named, and by whom.

"The syndics are unhappy," said Julian, letting his mouth curve slightly downward to suggest he did not feel differently. "They believe there has been a lack of forthrightness."

"Which is nonsense," replied Suyin, as crisply as she could. Unconsciously she straightened her spine. "If they could document something, it would be in front of you. They certainly tried — there are paw prints all over my files."

"Nothing documented, no. Although ..." Julian glanced down at his desk screen, which showed only as a transparent film from Suyin's angle of vision. "The encounter in The Woods has provoked some questions."

"I know they have been grilling the Parks overseer, who offers them no comfort. Had I been aware of my daughter's activities, I would surely not have spoken to him in the first place."

Julian looked slightly pained. "Nobody is inquiring actual complicity with your daughter's involvement. But the fact that you came upon suggestive evidence, and did not report it, looks bad. The manufacture of illegal narcotics is a serious offense, especially when children are involved ..."

Listening to him, Suyin thought: The cops are angry and looking to lash out. Of course they are imputing complicity; that's how the CP thinks. But you know better.

"And that was without their knowing about your involvement with Toshiko Ota," Julian added.

Suyin looked at him dumbly. "Toshiko Ota has nothing to do with this," she said, too late.

"No, of course not. Julian was looking at her almost kindly, as though concerned she understand what had and hadn't harmed her. "It is a matter more of style, perhaps. Civil

Peace wants an investigation, and I find it awkward to deny them while possessing information that they would find, in their root-snuffing way, to be significant. It is not a situation I enjoy."

"I understand. Understanding was in fact almost beyond her; Suyin regarded, appalled, the devastation about her."

"Very well, then," Julian paused over the agenda before him, as though wondering what items remained within Suyin's new compass of responsibilities. "Have you looked at the net talk concerning that novel?"

"Oh, yes. Very interesting. A critical apparatus seems to have sprung up around the text, with various hands contributing annotations and glosses. Much of it is the work of innocent enthusiasts, but may still cast light on the text's authorship and sources."

"Indeed," Julian looked mildly bored. "That would be welcome, but I cannot see how a body of amateur scholars could disclose an influence we have not traced."

"It has already happened," Suyin took a breath. "The material in the novel relating to the Security Agent was provided to its author by Toshiko Ota, who gleaned it from observations made of me. He has been unguarded in expressing his reactions, and I recognized his turns of phrase."

Julian's eyes widened slightly. "Please continue," he said.

"Ota has long been in contact with members of the small core of actual secessionists, who are taking an interest in him. The contact is one-way — they know of him, but he still knows little or nothing about them — and he chafes at not being brought into their confidence."

"He is indiscreet — only slightly, but the practice is habit-forming — when in my room. It is, in its way, an aggressive act. He speaks freely there, knowing that it is not bugged, in order to show a kind of contempt. He is also demonstrating something — to me, but also to himself."

"I have not reported on this, because the actual results to date remain scant. Moreover, I did not —" and here she looked at Julian meaningfully — "wish to arouse the interest of others, who might interfere with an especially delicate investigation."

Julian was studying her intently, as though she had abruptly transformed into a peacock. "And the author of *The Truest Chill*?" he asked.

"Not Ota, although Ota has spoken to him. I did not know this until I looked at the novel last night. A blush began to rise through Suyin's skin. The truth of this humiliating admission shone through her performance, like an infrared glow that betrays one's presence in the dark."

"I see," Julian was making notes. "You should write me a formal report on this. His expression seemed faintly bemused, as if he were not yet certain of his reaction."

Suyin rose, feeling her legs tremble. As she touched the door Julian cleared his throat discreetly. She turned to look at him.

"Nice recovery," he said.

Flora had requested no visitors, but parental privilege overrode that. Suyin stood

looking down at her daughter, who stared resolutely at the floor. Any attempt to muster a sense of indignation was quickly blown away on a gust of helplessness.

"I'm trying to get you out of here, but there are difficulties," she said at last. "The CP is anxious not to appear lenient to someone whose mother has been proclaimed a spy, since that would play into the hands of people like Toshiko."

"He said you would blame him for this," said Flora, not looking up.

Suyin was startled. "I haven't spoken to Toshiko since before this happened. Sent you a note, did he?" Flora did not answer.

It had occurred to Suyin, in her first rage, that Toshiko might have had a hand in her daughter's malfeasance, but the suspicion had drained away with the morning light. Now she could not think of him without feeling a wave of shame and anger.

"There is no reason for you to be held here like some drunk in a lock-up," she said awkwardly. She wanted to demand why Flora had done such a stupid thing, whether she realized the damage this had wrought upon both their lives. But she could say nothing like that now; it would be all she could manage to hold to what fragments remained.

"They want to know who my friends are," Flora said in a low voice.

Suyin was again caught by surprise. *Those wood lice?* she nearly asked. Her second thought was to tell Flora that the Civil Peace had almost certainly identified the other leggers, and was merely sounding her willingness to cooperate. But that would get her back up; she would think Suyin wanted her to betray her comrades.

"You should think about who your friends are," Suyin told her. It was as close to admonition as she dared come.

Flora looked up at this. "A spy's daughter can't be choosy," she said.

It was nothing for Suyin to react impulsively to this. Part of her mind noted the opening to argue that Flora's distress at seeing her mother denounced as secret police drove her to commit antisocial acts in order to win the acceptance of her peers, while another part walked silently at Flora's pain, and a third — she realized only slowly — was numbed with pain for herself.

"Is that what you think I do?" she asked. "Inform on others?"

"They say you report on people interested in the Black Ship."

The injustice of this charge seemed an undeserved pain, cooling hurts Flora couldn't see. "I don't even report on people smoking in the Woods," Suyin told her.

Flora lifted her chin truculently, suspecting self-service. "It's true," Suyin said sadly. "You I have never betrayed. With that, at least, you not believe?"

Impulsively she squeezed her daughter's hand. Flora tried to pull away but Suyin clung fast, like a planet that held its orbiting companion in a grip too strong to escape. □

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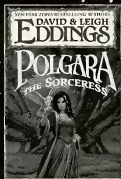
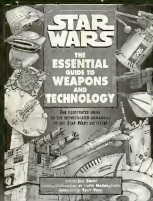
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GAMES

By Eric T. Baker

Computer gaming grows more three dimensional every day.



Dungeon Keeper (above), Shadow Warrior (center) and Duke Nukem (bottom) all deliver their thrills in 3-D.

GAMES EVOLVE THE WAY THAT WE THINK EVOLUTION should work. They start out simple and abstract. With each generation, they slowly grow more complicated and more realistic. Nowhere has this been more evident than in the genre of first person, shooter video games. From the EGA graphics of *Catacombs 3D* to the square corners and thick walls of *Castle Wolfenstein* to the three dimensional projection of a two dimensional map in *Doom* to the true three dimensional levels of *Quake*. Each game is a little more evolved than the last, and as computers continue to get more powerful, the trend shows no signs of changing.

What all of the games listed above have in common is that they are all created by id Software. The first two of those games were released by Apogee Software, Ltd. id went on their own for *Doom* and *Quake*, but the creators in both companies remained friendly and that friendship has led to Apogee, through its 3D Realms division, licensing id's *Quake II* game engine for the next installment in Apogee's popular *Duke Nukem* franchise. GT Interactive Software Corp., a publicly traded software publishing company, is also part of the deal. They have

purchased all the rights to market the new game, which will be called *Duke Nukem Forever*, as well as its merchandise. The game is due out for Christmas.

The strange thing about 3D Realms going to id for its game engine is that *Duke Nukem 3D* went toe to toe with *Quake* last summer and more than held its own, despite its less evolved, 3D Realms designed, Build game engine. The Build game engine still uses two dimensional textures mapped on three dimensional shapes, while the *Quake* world is built completely of polygons for a smoother, realer look and game play. What *Duke* had going for it, however, in its face off with *Quake* last summer was its sense of humor. A low brow, adolescent, misogynist sense of humor, but a sense of humor nonetheless. *Duke* was simply more fun to play.

Despite their success with their less evolved Build game engine, 3D Realms is pushing forward with their own, next generation engine called Predator. The problem for the company is that the Predator game engine (which will power a game called *Prey*) won't be ready until late 1998, by which time gamers might have forgotten about *Duke*. 3D Realms needed to put out another *Duke* game while the franchise was still hot, but they wanted one with a better game engine than the Build one. So they called id.

Not that 3D Realms is completely finished with its Build game engine yet. As you read this, the full version of 3D Realms's *Shadow Warrior* should just be arriving on game store shelves. In *Shadow Warrior* you play an 80 year old Ninja named Lo Wang, out to stop an evil scientist and his genetically twisted minions. Armed with a sword,

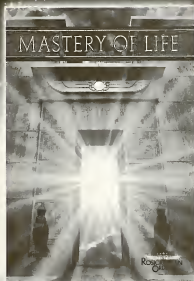
shuriken, uzis (one for each hand in a John Woo/*Rise of the Triad* tribute), a close assault weapon, a rocket launcher, a grenade launcher, sticky bombs, flash grenades, smoke grenades, and poison gas grenades, you cut a swath of death through city streets and back woods.

The chance to play a chop socky ninja battling other enemy ninjas makes *Shadow Warrior* the best first person shooter I've played since *Dark Forces*, the Lucas Arts game where you got to blast Imperial Storm Troopers.

Duke Nukem had a lot of rooms that were underwater, but the water was always opaque until you were under it. In *Shadow Warrior*, the water is transparent so you can see (and, more importantly, shoot)



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Warsport (top) and Shadow Warrior (below) both put players in the middle of the action.

down into or up out of the various pools you encounter. On the second level, there is a broken forklift with a machine gun strapped to its hood. Once you fix the forklift, you can climb in and drive it about the construction yard, crushing enemies under your wheels, or mowing them down with the gun.

Perhaps the biggest improvement in *Shadow Warrior* is the increased intelligence of the enemy ninja. They are not wildly smarter than the foes in previous shooters, but they don't immediately charge you with the dogged kamikaze single-mindedness that makes most shooters pretty straight forward slaughter-fests. In *Shadow Warrior*, an enemy ninja armed with an uzi and concealed behind a counter will stay behind the counter, popping up to shoot at you and then ducking again when you shoot back. Hence the utility of the indirect firing grenade launcher and the various grenades.

The lure of playing computer games against other humans is so great that a big emphasis in the game market now is on-line games, where a provider runs a shared world on their server and gamers from all over the world log in to play. No one doubts the increasing popularity of on-line games, but what is in dispute is the best way to make money from them. The most common method, pioneered by first BBSs and later the big on-line services like CompuServe, is simply to charge gamers an hourly fee for the time they spend playing. A growingly popular variant is to charge a flat monthly fee for all the time a gamer wants to spend.

Now a company called Timesink is trying to launch an on-line gaming service that will emulate the wildly popular Juno Free E-mail company. Founded only a year ago,

Timesink's plan is to offer their software for free and to let people log-in to their server and play for free. Timesink will make its money the way that Juno does, by selling advertising that will be piped to players when they log-in and during half-times of the games. While having to endure commercials before being able to play your game sounds annoying, it is impossible to over-estimate the lure of free software and services on the internet. Juno, for instance, has more subscribers than any other on-line service in the world, despite its commercials and limited capabilities.

Timesink's first game, *Warsport*, is currently Beta testing. Its full version should be ready around Christmas. They plan to offer a new game every six months.

Not all human vs. human computer games are first person shooters, and not all of them require a server. Avalon Hill, for decades the industry leader in strategy boardgames, launched a computer division a few years ago. While they do some original-to-the-computer games, the main focus of their software division is to port the company's vast catalog of boardgames onto the computer. Their most recent and most successful effort is *History of the World*.

The board game version of *History of the World* is one of Avalon Hill's all time best sellers because it combines a compelling and interesting premise with simple game play. Unlike so many of the ten pound bookcase boardgames, the rules for *History of the World* could be explained in minutes and the board could be set up in less time than that. Once the game begins, the players take turns directing the great engines of history, trying to accumulate victory points from epoch to epoch. The game played so well that the only kink was counting up those victory points, making sure you didn't miss a monument in central Asia or city in Gaul.

The computer game version of *History of the World* removes the kink; the computer keeps track of the victory points for you. In fact, it acts as the umpire, handing out cards, prompting players for their turns, rolling the dice in combat, even playing some of the engines if you want some computer players to supplement your human ones.

For a different kind of strategy game experience, Bullfrog has released a new real-time strategy game which threatens to be the most addictive timesink since the original *Sine City*. It is called *Dungeon Keeper*, and it turns the traditional fantasy role-playing premise on its head. Instead of playing a hero bent on looting a dungeon, you play a dungeon keeper trying to defend your turf from those pesky heroes. You dig out tunnels, furnish rooms, recruit monsters, lay traps, and even try to take over other Dungeon Keepers' dungeons. It uses a fully polygoned, 3D interface, and you can look at the dungeon in overview, or else take over any of your monsters and watch the game through their eyes. □

McCARTHY: I'm not convinced. Every one of those findings has an equally plausible mineral explanation. On a bumpy rock, it's not hard to find bumps that look like something.

LANDIS: Yes, but all of the features together? Seems an unlikely coincidence.

McCARTHY: Water may allow for life, but I don't see that it *guarantees* it by any means.

LANDIS: But Earth life evolved damn near as soon as the surface cooled down to allow it. You could certainly believe that Mars life started as fast.

McCARTHY: Oh, it's a very compelling case, don't get me wrong. It definitely merits the highest scrutiny we can give it. But for the time being I have not been convinced.

LANDIS: I agree we really do need some samples. I'm willing to go get them.

McCARTHY: Possibly, the evidence that *can* convince me will never surface. What then? Recently, I heard about "fossils" being found on a meteorite that *didn't* come from Mars. So that either greatly increases or greatly decreases the credibility of the ALH84001 finding.

LANDIS: Yes, isn't that interesting? Fossils from the asteroids, now that's a real SF concept. I'll be interested in seeing what happens next! We live in interesting times!

McCARTHY: Even if Mars did have life, or even if it does, it obviously hasn't done a good job of building a safe, regulated environment for itself the way Earth life has. One glance at Earth will tell you there's life here. On Mars, even after 20 years of close study, we're still not sure.

LANDIS: Yes, it's a real cautionary tale. The lesson is, a good planet is hard to find!

McCARTHY: I'm doubtful about life on asteroids. If the Mars life is there, we might actually be doing it a favor by terraforming. Maybe it wants to thrive, but can't.

LANDIS: Well, terraforming is a long-term prospect.

McCARTHY: I'd be happy to live on Mars in a dome, but in the long run I'd rather we be able to run around and breathe the air. We have 10,000-year projects going on all the time. Agriculture is one.

LANDIS: It's hard to guess what type of society we'd have to have before we start in on 10,000-year projects.

McCARTHY: Mars is right there waiting for us to take advantage of. Not in an explosive way — bringing resources back to Earth would be a huge waste. But Mars doesn't have much of a life right now. Squirmer is rolling over rocks that have been sitting unchanged for a billion years. I say we stir things up a little! A living, breathing Mars might be the greatest thing humanity has ever created.

LANDIS: It's been exciting to have been a part of the Pathfinder project. For years we've been reading science fiction about going to Mars. Now, at last, we're living it. □

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INTERNET

by Cory Doctorow

This month's column features the many attractions of sff.net, a kind of Internet clubhouse for writers and readers. Thanks to Charles Obendorf for suggesting this!

Find-A-Grave

<http://www.findagrave.com/>

Jim Tipton has a rather unusual hobby: he collects earth from the graves of the rich and famous. No, really. If you ever wanted to take this up yourself, you could do worse than to use his online resource. He gets a million cool points for having a picture of him kneeling at Philip K. Dick's grave.

Terry Bisson Story Showcase

<http://sff.net/tfbob/>

Quirky, award-winning author Terry Bisson ("Bears Discover Fire," *Pirates of the Universe*) writes brilliant short fiction, nonfic, and novels. Check his site for complete story-texts, plays adapted from his work, and notes from the author on his work.

The Locus Index

<http://www.sff.net/locus/0start.html>

A monthly guide to what's new in SF — the novels, the anthologies, the magazines, the short stories. Includes Locus' reviews.

Basement Full of Books

<http://sff.net/tfbob/>

A place where authors directly retail their hard-to-find works to their readers. Participating writers include Pat Cadigan, C.J. Cherry, Harlan Ellison, Joe Haldeman, Ursula K. LeGuin, Gene Wolfe and Jane Yolen. This resource has been around for years online, in one form or another, and it's gratifying to see it on the Web.

The Market List

<http://www.marketlist.com/>

Christopher Holliday maintains this resource for genre writers: each month, he posts a new, extraordinarily complete list of open magazine and anthology markets. Also

▼ Lost in Space 1997



▲ Find-A-Grave

here are guest reviews of current issues of genre magazines, articles and interviews on the writing process, and alerts about defunct markets, bad contracts and late payments.

James Patrick Kelly

<http://www.nh.ultranet.com/~jinkelly/>

"Gentleman Jim" Kelly's homepage is every bit as witty and charming as the man himself. Here, you'll find complete stories, essays on writing and the state of the genre, a complete bibliography, and out-of-print works for sale.

SFF Net Newsgroups

<http://sff.net/sffnews/>

A mixture of private and public discussion forums that harken back to the good old days of GEnie, when the leading lights of the industry let it all hang out, kidding, fighting and debating. A truly science-fictional experience.

Bookpages

<http://www.bookpages.co.uk>

Bookpages is the best British online bookstore I've ever found. The perfect place to order hard-to-find UK editions by trans-Atlantic and Commonwealth genre writers, such as Ian Banks, Ian McDonald, Terry Pratchett and Tom Holt.

The Hubble's Greatest Hits

<http://oposite.stsci.edu/pubinfo/BestOf/HST95.html>

Breathtaking digital photos from the Hubble Space Telescope: Saturn storms big enough to swallow Earth, black holes, distant galaxies, comet bombardment of Jupiter. Now this is science!

Lost in Space 1997

<http://www.mich.com/~anti-matris/>

Not the official site (which, FYI, is at <http://www.lostin.space.com>), but a fan site chock-a-block with obsessive trivia on the original series and the upcoming feature film.

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